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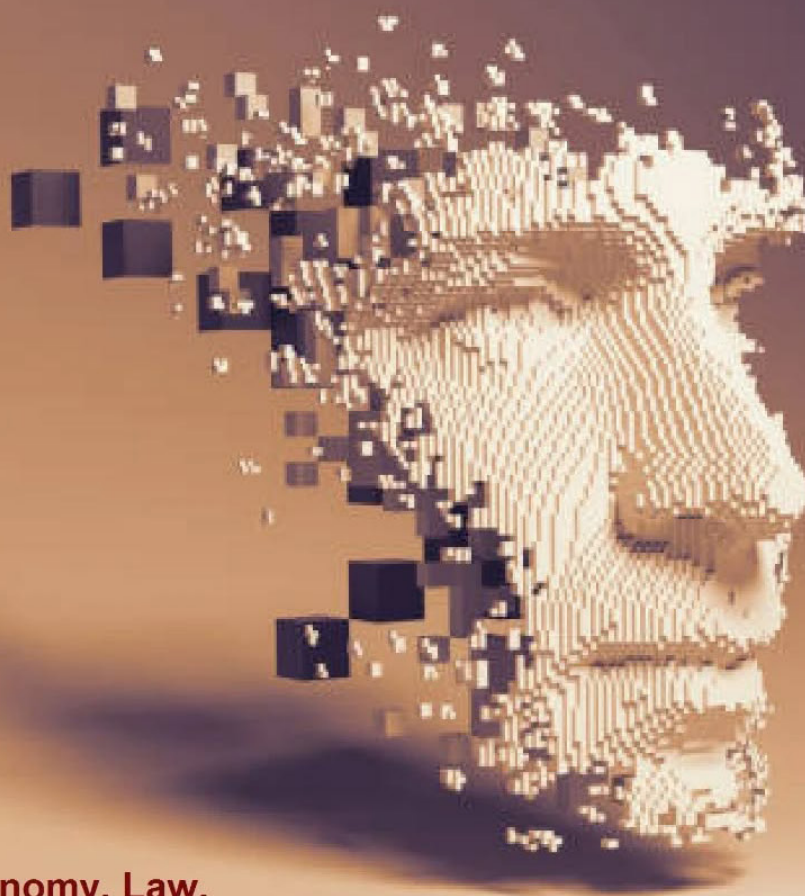
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MANAGEMENT OF WATER DEMAND ELASTICITY POTENTIAL

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Abstract: Public water supply, as a natural monopoly, implies the provision of sufficient quantities of drinking water, as well as the drainage and treatment of used water by utility users. Regulatory framework of water supply organizations, availability of resources, management, economic potential, national history and culture; potentially affect the structure and level of water supply prices. Optimization of operating costs of water supply organizations, harmonized supply and demand of water in the context of sustainable development, are inputs in defining the business framework. Based on the conducted independent research, meta-analysis identified and analyzed the examined variables, their Relationship with each other and the moderators. It is necessary to know how supply and demand react to changes in water prices, what are the results and their implications!? Although standard neoclassical economics is based on preferences and a continuous function of water utility, the result of the research on the analysis of indicators of water use, water price and household income, indicates a complex reaction of variables. Price elasticity of demand is a measure of how much the quantity of water demanded changes when its price changes, expressed as a percentage. Principal implements various innovative economic instruments for more efficient management of water resources, promoting water conservation and reducing water consumption, during the implementation of various economic activities. The application of smart systems for measuring water use is recommended, which are based on the development of digital architecture, which creates the prerequisites for determining the direct causality of demand elasticity and pricing policy on the one hand, in relation to total revenue, covering capital investments, operating costs, and providing missing resources and degraded environmental values.

Keywords: *Water supply, pricing policies, elasticity of demand, water use efficiency.*

Field: Social Sciences

1. INTRODUCTION

As a natural resource of general interest, water is essential for basic human needs, and one of the most important factors in economic growth and environmental management. As such, it enjoys special protection from the state.

Public water supply, as a natural monopoly, means the performance of business activities of providing enough drinking water, as well as draining and purifying used water of utility users.

Main causes of barriers to entry are the key resource is owned by one organization, the principal grants a concession – the exclusive right to produce a good or provide a service, and the cost of production makes one producer more efficient compared to many producers. (Mankiw GN. Taylor MP, 2006)

To understand the use of water in the household, in most national regulatory allocation frameworks, are included: (Reynaud, 2015)

The needs of the household and the population as the most priority for the use of,

Most large-scale water use models predict significant changes in household water use over the next 50 years.

Water is an essential good, there is no substitute for most indoor water uses (drinking, personal hygiene, cleaning...).

The elasticity of water demand in relation to price largely depends on the type of market and the water price policy in each country.

By analysing the parameters of the variables (Lopez MG. Montano B. Melgarejo J, 2020) use, use, water price and household income; identifies the complex reaction of use, income and prices; This leads to savings and a lower margin of reaction to the increase in the price of water. This is especially true in conditions when the problem of water supply is (Radosavljević Ž. Anđelković Maja. Radosavljević M, 2021): “becoming more complicated, because it shows that there is already a water supply crisis in large urban areas, which are increasingly becoming overpopulated and consuming more water compared to the previous period, but also due to the decreasing amount of healthy and drinking water, due to pollution at the global level.”

The aim of this paper is to review water management policies and practices, which ensure the optimal relationship between water prices and changes in the level of water demand, analysis of results

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and their implications.

Principal implements various innovative economic instruments, optimizing harmonized supply, demand and operating costs, for the efficient management of water resources, and promotes water conservation during the implementation of various economic activities.

2. MATERIAL AND METHODS

Demand Management Strategy (DMS) is a systematic approach that organizations use to understand, predict, influence, and meet users' water needs. The goal is to achieve a balance between supply and demand, optimize resources and minimize waste.

The water price model starts from simultaneous elements (Beecher JA, 1994): recognizing public functionality in cost allocation (economies of scale), calibrating the minimum bill according to property valuation (capacity value), providing compensation for necessary household use (public health), designing cost-based pricing for variable water use (resource management) and the prohibition of exclusions and the application of restrictions on water use (water safety).

An empirical study identifies the presumption of the development of water demand over time, taking into account the variants: Assumptions of GDP levels, Demographic assumptions, Water-use efficiency (Javid M, 2024) (WUE) and defined the technology gap in practice to optimize use by 2050, and the price of water to raise financial stability.

The demand for water by households strongly depends on dimensions that include climate, behaviour of water users, efficiency of the technology used during use, incentives and awareness of users when using water. The use of water in the household is viewed through the price of water, household income, demographic indicators, and in modern business conditions, the study uses the WUE indicator as an important determinant of water use.(Javid M, 2024)

Price elasticity of demand is a measure of how much the quantity of water demanded changes when its price changes, expressed as a percentage. The assessment of relevant variables was carried out on the basis of a comprehensive review of the literature, independently conducted research: in terms of price elasticity of demand, in the context of income elasticity of demand, on universal equality and efficiency for determining the price of water; on cost-effective and non-cost-effective approaches to water conservation and assessment of the impact of the increase in water prices on the efficient use of water in households; Regarding the impact of society's policy for saving water in the use of cities in cities; Water pricing policies as a tool to promote efficiency in the management of water resources; on the economics of water scarcity and institutional solutions; 64 econometric studies on pricing policies, elasticity of demand, information and education campaigns in the United States; on cost recovery and elasticity of demand through water prices of water service operators of the 28 EU countries; and consideration of socially acceptable prices of 8 cities in Serbia; Primary data was collected, and using meta-analysis, the examined variables, their mutual and relationship to moderator variables were identified and analyzed (Samuelson PA. Nordhaus VD, 2005) in terms of price elasticity of demand; (Mankiv GN. Taylor MP, 2006) in context of income elasticity of demand; (Becher JA, 2020) on universal equity and efficiency in water pricing; (Javid M, 2024) on price and non-price approaches to water conservation and assessing the impact of water price increases on efficient household water use; (Zhao Y. Min L, 2020) regarding the impact of society's water conservation policies in cities; (Lopez MG. Montano B. Melgarejo J, 2020) regarding water pricing policies as a tool for encouraging efficiency in water resources management; (De Waat D. Khemani S. Barone A. Borgomeo E, 2023) on the economics of water scarcity and institutional solutions; (Maas A. Puri R. Goemans C, 2024) within 64 econometric studies on pricing policies, demand elasticity, information and educational campaigns in the USA; (European Environment Agency, 2017) on cost recovery and demand elasticity through water prices of water service operators in 28 EU countries; and (Лукић Д, 2014) examining the socially acceptable price of 8 cities in Serbia; primary data was collected, and using meta-analysis, the investigated variables, their mutual relationship and their relationship to moderator variables were identified and analyzed.

Smart Water Metering (SWM) technology is a milestone in the field of water management, as the provision of accurate, real-time water use data analyses water usage trends and demonstrates the potential benefits of water savings, with a focus on sustainability and environmental protection. It is necessary to know how supply and demand react to changes in water prices, what the results are and their implications!

3. RESULTS

The use of water in the household does not depend on the price of other goods consumed by the user, for at least three reasons: there is no substitution for the water used in the household, household habits can be considered constant, and it is unlikely that the complementary goods that use water in the household (machinery, washing, sanitation...) will change in the short term.

The equation of water use in the household can be represented as follows:

$$W_t^d = \alpha_0 + \alpha_1 p_t + \alpha_2 y_t + \alpha_3 pop_t + \varepsilon_t \dots\dots\dots (1)$$

In the above equation, it denotes the use of water in the household, - the price of water, - income, and - the population. W_t^d, p_t, y_t, pop_t

Some studies have used the WUE indicator as an important determinant of water use, in terms of responsible use, minimization of waste and reduction of the level of water use; which depend on the behaviour of the user and the technological efficiency of the apparatus (machines, low-pressure taps, showers...). Thus, WUE was introduced as a supplementary explanatory variable of Equation (1), and thus obtained the expression:

$$W_t^d = \beta_0 + \beta_1 p_t + \beta_2 y_t + \beta_3 pop_t + \beta_4 wue_t + \varepsilon_t \dots\dots\dots (2)$$

Long-term integrated water management involved instruments for setting water prices (e.g., tariffs) and measures not directly related to prices (e.g., water-saving devices, education and awareness-raising campaigns) for more efficient water use.

On the offer side (Lopez MG. Montano B. Melgarejo J, 2020), the increase in prices led to an increase in revenues, creating the prerequisites for the sustainability of new projects, incentives to avoid water losses and enabling improved management through optimal maintenance of the water supply system.

Table 1. Price elasticity of urban water demand in some countries

Serial number	Country	Region	Method	Elasticity of demand for water	Notes	Sources
1.	Spain	North-west	Regression (OLS)	-0.14 to -0.17	1993-1999	(Martinez-Espineira, 2000)
2.			Marginal price	-0,34	Beyond a minimum	
3.				-0,20	Consumption in summer	
4.	France	Gironde	Regression (OLS)	-0,17	1975	Point (1993) in (Nauges, 1999)
5.		Country	Regression (OLS)	-0,10 to -0,20*	1975-1980-1985	(Boistard 1993)
6.				-0,25 to -0,35**	1990	
7.		Country	Regression (OLS)	-0,12	1989	(Pouquet and Ragot, 1997)
8.				-0,32* to -0,31**	1995	
9.		Yerres Basin	Regression (IV)	-0,31	1995	(Le Coz, 1998)
10.		Gironde	Regression (IV)	-0,08	1990 to 1994	(Nauges and all, 1998)
11.		Moselle	Regression (IV)	-0,22	1989-1993	(Azomahou, 2000)
12.			Regression (Panel)	-0,23	1989-1993	
13.	Greece	Athens	Chronological regression series (macro elasticity)	-0,4 small consumers	Consumption Band <15m ³	(Ghini, 2000)
14.				-0,8 large consumers	>60m ³	
15.	Tunisia	Country	Regression	Lower block: -0.06 to -0.15 (Country: -0,08)	Consumption Band <70m ³	(Matoussi and Baranzini, 1998)
16.				Higher block: -0.28 to -0.91 (Country: -0,58)		
17.	Cyprus	Country	Water Demand Model	-0,79 (for the lowest 10% of incomes)		(Haispryrou at all. 2001)
18.				-0,39 (for the highest 10% of incomes)		
19.	Germany	Country	Regression (OLS)	-0,229		European Environment Agency 2017
20.	Italy	Country	Regression (OLS)	-0,47		European Environment Agency 2017
21.	Europe	Country	Regression (OLS)	-0,40		European Environment Agency 2017
22.	USA	Country	Regression (OLS)	-0,41		European Environment Agency 2017
23.	Australia	Country	Regression (OLS)	-0,15 to -0,39		European Environment Agency 2017
24.	Czech Republic	Country	GLSivlag	-0,18 to -0,28		(Reynard, 2015)
25.	Notes: *in the short term (2 to 3 years), **in the long term (5 to 10 years) OLS= Ordinary Least Squares; IV= Instrumental variables					

Sources: <http://planbleu.org.en>

<https://www.eea.europa.eu/publications/water-management-in-europe-price/file#page=7.11>

The previous table illustrates the results of the research, which indicate the present range of elasticity of water demand in urban areas of different countries, which is negative and statistically significant. At the same time, two factors had a dominant impact on price elasticity, namely the amount of water (large users are more reactive to price changes than small users) and the level of income. User. Water demand became more elastic as volumetric water use was identified, defined by innovative tariff structures and price increases.

The range of income elasticity of the beneficiaries indicated the breadth of the range, and the beneficiaries were willing to reduce their water consumption when the costs began to make up a significant part of the household income, as illustrated by the following table:

Table 2. Income elasticity of water users in some countries

Serial Number	Income elasticity	Country	Value %	Notes
1.	Very low	France, Croatia, Germany, Greece, Austria, Spain	0,00-0,25	A significant impact of changes in household income on water usage per capita is not expected.
2.	Higher	Bulgaria, Estonia, Cyprus, Lithuania, Latvia, Portugal, Slovakia	>0,50	Estimating the trend of water usage is very difficult due to opposing effects: the expected increase in income and the rise in the price of drinking water.
3.	Based on accessibility threshold	Countries in transition	0,5 – 1,2	Serbia, cities: Kraljevo, Loznica, Pančevo, Smederevo, Sombor, Sremska Mitrovica, and Vršac.

Sources: (European Environment Agency, 2017)
 (Author's research, 2014)

A real concern, about the accessibility of the service for groups of households with the lowest incomes, in practice pointed to alternative social support instruments in the form of subsidies to water supply operators and infrastructure owners, exemptions of activities with limited impact on the water system, subsidies with the aim of social equality, and environmental improvement goals.

It was necessary for water pricing systems to be designed to consider the specific conditions and characteristics of areas and households, when applying the accessibility threshold.

Information and education campaigns, which are not directly related to prices, provided users with general information, and when compared, they were relatively consistent in the estimated response between 2-8% reduction in average water use. (Maas A. Puri R. Goemans C, 2024)

Defining an effective mix of instruments had to be considered in the context of the specific characteristics of each country, in terms of availability and challenges related to water demand. For several years now, the Republic of Serbia has been facing a challenge regarding water supply, which is why special attention must be paid to the management of water resources. Given that water is a vital necessity, "it is necessary to introduce priorities in water investment... Which is the problem of the national government, because it is evident that "the state of the water systems is bad. This is also stated in the EU Drinking Water Directive; (Radosavljević D. Anđelković M. Radosavljević M, 2018): "the overall state of water supply systems, which is said to be characterized by the poor condition of infrastructure as a result of equally poor financial conditions of public utility companies, insufficient funding from local self-government units, state budgets and other sources. "

4. CONCLUSION AND DISCUSSIONS

The water supply paradigm is since water is a natural resource of general social interest, which, as a natural monopoly, brings public and private benefits.

Urbanization, socio-economic development, changing patterns of water use and climate change are the main drivers of increased water use. At the same time, there is an inefficient use in the context of rapidly increasing levels of water demand.

4.1. CONCLUSION

The principal implements various innovative economic instruments for more efficient management of water resources, whereby the summary of the findings should be viewed through:

- 1) The fact that water is a normal good, characterized by levels of water use in the household, which increase with the increase in the level of household income.
- 2) Smart infrastructure (technologically advanced pipelines, designed valves in the network, leak locators, digital meters and two-way communication in real time) with proactive management, is the backbone of modern water supply management.
- 3) The WUE indicator is an important determinant of the responsible use of water and the technological efficiency of the appliances used.
- 4) Water users, traditionally encounter one of the four price structures and are poorly informed about the price structure.
- 5) Price elasticity of demand is a measure of how much the quantity of water demanded changes when its price changes, expressed as a percentage. The analysed studies indicate a typical price elasticity of demand in the range of -0.10 to -0.40, in most countries.
- 6) The income elasticity of demand shows the extent to which the amount of water demanded

responds to changes in household income. The fact is that households with relatively low incomes are the most sensitive to changes in water prices, and the income elasticity of water demand is different, given the stability of income per capita, expected income growth, i.e. the expected trend of water prices in countries.

7) The problem of tariff affordability has emerged in countries in transition, following the abolition of price controls, the reduction of public sector subsidies and the overcoming of the gap between the payment of the fee and the cost of water supply.

8) Subsidies and exemptions from water charges, by creating market distortion mechanisms in the implementation of pricing policies, prevent the efficient use and allocation of resources.

9) Public awareness campaigns are considered an effective means of reducing water use. In times of acute water scarcity, they are considered effective in the short term and have little or no demand impact in the long term unless accompanied by other measures.

4.2. DISCUSSIONS

Water is a homogeneous good, which in real conditions of use in the household is a complex good. Structurally, it consists of (Reynaud, 2015) direct use of a small amount of drinking water, and as a supplement to other household activities for washing, cooking, hygiene.

The use of domestic water implies the assumption that there is no substitution for the water used in the household, household habits can be considered constant, and it is evident that the complementary goods that use domestic water (machinery, appliances and sanitary facilities) are unlikely to change in the short term.

The analysis of indicators of water use, price and household income indicate a complex reaction of the identified and analysed variables. Primarily, the question arises of the incentives of the existing pricing system and their implications for more efficient use of water.

The structure of the price of water implies a different econometric approach, whereby the following are recognized: lump sum – which implies the possibility of charging for used water without installing a water meter, without determining a marginal cost; unique – implies a constant volumetric limit price; seasonal – due to the influence of geographical, climatic differences of the territory, associated with high temperatures and the arrival of tourists; and layered nonlinear structure – based on the use of m³, varies within certain ranges of use, has the forms of an increasing and decreasing structure.

The management systems of water supply organizations vary significantly, depending on the specifics of the country, national history, regulatory framework, culture, and availability of water resources. (Dige G. Strosser P. De Paoli G. Anzaldúa G, 2013)

Demand management strategies are a systematic approach used by organizations to understand, predict, influence, and meet users' water needs. The goal is to achieve a balance between supply and demand, and to optimize resources and minimize waste.

In a real-world environment, it is not possible to separate the different types of demand, so the estimated elasticity is based on the aggregate household demand for water. The range of elasticity of the demand of groups of users for water was registered for the first time in individual users -0.20 to -0.40, with a price increase of 10% reducing water demand by 2-4%; and in commercial and commercial -0.50 to -0.80. (Beecher JA, 1994)

The elasticity of demand is typically non-elastic for most EU countries, the use of water in the Households are falling by less than 1% for every 1% price increase, according to a report by the Joint Research Centre - Institute for Environment and Sustainability "... A 10% price increase is expected to reduce household water use by 1-5%" – suggesting that the price of water plays a role in the process of signalling water scarcity or household water costs. (Reynaud, 2015)

In Italy and France, water demand is correlated with household size – a factor of 1.6 and 0.8 respectively. A very similar effect is identified in situations where there is a common water meter for several apartments in an apartment building.

The elasticity of the price of demand measures the sensitivity of water use to changes in household income, provided that all other conditions are equal. Households with relatively lower incomes are the most sensitive to price changes, because they allocate a larger part of monthly household expenditures. At the other end of the price adjustment spectrum, we identify households with irrigation, watering, swimming pool systems... They don't respond to price increases with the same approach.

When considering the problem of the accessibility threshold, the key question is whether the user could pay and whether he is willing to pay for the water used. The threshold for the accessibility of water use is defined differently (Лукић Д, 2014) by international and bilateral financial organizations (OECD=3-5%, EU=3-4%, US EPA=2.5% и IFI=4%) of household income. The Socio-Economic Study of Water Supply in Serbia, conducted in 2005 and 2008, analysed clusters of all variables (average number of

household members, average income per household member, daily water consumption per capita, and accessibility threshold according to the standards of organizations) of household budget use to determine the part of household income on water use in the cities of Kraljevo, Loznica, Pančevo, Šabac, Smederevo, Sombor, Sremska Mitrovica and Vršac.

Subsidies and exemptions from water charges, as alternative social support instruments, can play an important social and political role in times of crisis.

Information and educational campaigns are not directly related to prices, they include billboards, emails, classes and social networks. (Maas A. Puri R. Goemans C, 2024)

Most of the reference studies on the price elasticity of water demand date back ten years or more but are still in use. There is a need to develop new case studies with primary data, which would provide relevant evidence, and explain contemporary socio-economic, managerial and technological changes.

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FOUCAULT, FITNESS, AND THE FABRICATION OF THE SELF (EXPOSING POLITICAL ANATOMY OF THE NEOLIBERAL BODY)

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Abstract: The research uses Michel Foucault (1926–1984)’s genealogy to study modern fitness culture by analyzing how power functions through body discipline and self-regulation and surveillance in contemporary health and exercise practices. The research uses Foucault’s concepts of docile bodies and panopticism and political anatomy and biopower to analyze how gyms and fitness technologies and wellness ideologies create micro-institutions that generate subjects who are compliant to globalist culture. The research examines from how physical fitness spaces (gyms, studios) and digital platforms (apps, trackers, social media) operate as disciplinary institutions which transform people through repetitive practices while being monitored and quantified. The research examines fitness discourse together with wearable technology and the quantified self-movement to demonstrate if modern health culture really shifted from external control to self-imposed discipline which makes individuals both subjects and objects of power. The research demonstrates how the modern fit subject exists under continuous optimization and surveillance and moral judgment while being responsible for their own well-being. The research investigates the political aspects of fitness as a form of embodied citizenship through self-transformation practices and monitoring systems in a neoliberal capitalist society.

Keywords: Michel Foucault, fitness, globalism, power, neoliberalism

Field: Social sciences

1. INTRODUCTION

The modern fitness culture has moved away from traditional practices which used to connect physical training to moral or spiritual development through the Greek kalokagathia ideal and medieval Christian body discipline (Vuković, 2013:83–100). Modern society values physical appearance and athletic performance above all else while separating them from personal development. The system which claims to empower people actually forces them to conform through self-discipline by turning individuals into monitoring subjects who use fitness apps and wearable tech and social media to track and judge themselves. The modern fitness movement differs from Sokol gymnastics because it emphasizes personal success and market-based self-esteem while promoting continuous body enhancement without considering emotional or ethical development (Pavlović, Filipović, & Popović, 2024, p. 261–267). This research uses Foucault’s power and surveillance theories to demonstrate how modern fitness practices function as neoliberal tools which create market-compliant bodies while discarding the complete unity between body and soul and community that characterized previous times. The research by Bauman (2000), Steger (2020), Sassatelli (2010), Hayes (2018), Cameron and Green (2015), and Salmenniemi and Gritsenko (2022) provide conceptual frameworks about cultural globalization, disciplinary regimes, institutional transformation, and self-surveillance which can be used to integrate our empirical findings about the global fitness industry as a Foucauldian “political technology of the body”.

In order to comprehend complex relations between globalism and growing fitness culture, this paper highlights Michel Foucault’s major work *Discipline and Punish* demonstrating how modern societies use disciplinary power to regulate individual bodies and behaviors and desires instead of traditional legal punishments. The pre-modern era used visible violent body punishment through public executions and torture but the modern period employs more subtle control mechanisms. Modern power systems focus on creating docile bodies through training and monitoring and normalization of individuals by using everyday routines.

Foucault bases his analysis on multiple essential concepts. The operation of disciplinary power depends on three main mechanisms which include surveillance and structured routines and social norms that establish acceptable behavior and appearance standards. The Panopticon serves as Foucault’s metaphor for modern society because it demonstrates how people internalize surveillance when they feel they could be watched at any time. The docile body emerges through social training which makes individuals internalize control mechanisms to maintain the existing social order while following productivity and health standards and attractiveness norms.

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2. MATERIALS AND METHODS

The research demonstrates how fitness culture expansion follows global integration patterns by analyzing quantitative globalization metrics together with fitness industry data. The research uses Foucauldian analysis to show how physical discipline operates within the operational structures of global capitalist systems. The research design combines three analytical methods which use secondary data sources. The KOF Globalization Index and World Trade Organization trade statistics serve to measure globalization while fitness culture expansion is tracked through four key indicators that include global fitness club expansion and industry market revenue growth and international fitness chain proliferation and digital fitness technology adoption. The research uses data from international reports (IHRSA, Global Wellness Institute, Strategic Market Research) and company records from major gym brands. The analysis of time-series and trends examines four essential years (1980, 2000, 2010, 2020) to identify synchronized developments and potential time-based relationships between globalization and fitness industry growth. The research conducts cross-national assessments between high-globalization nations (US, Germany, Japan, South Korea) and low-globalization nations (North Korea, Eritrea, Central African Republic) which serve as control cases based on Mill's "method of difference." The research employs descriptive and correlational statistical methods to show and analyze the relationship between globalization and fitness industry expansion. The research combines sociological economic and cultural perspectives through the integration of established globalization and consumer society theories and Foucauldian biopolitics. The research draws all its conclusions from verified secondary sources which enables replication and reliability without conducting original surveys or interviews. The extensive research design enables a strong evaluation of how fitness culture development relates to worldwide economic and cultural transformations.

3. RESULTS

3.1. Globalization and Fitness

The KOF Globalization Index increased from its low 40s during the 1980s to exceed 60 by 2020 while the US achieved a score of ~82 which supported a dense fitness market with 41,000 gyms and more than 64 million members. Germany and the UK maintain strong commercial fitness sectors which include numerous international gym franchises. North Korea along with Eritrea and the Central African Republic maintain no commercial fitness industry because they depend on state-run collective activities instead of market-driven fitness culture (KOF, 2023; Planet Fitness, 2024). The number of fitness clubs worldwide increased from 183,000 in 2014 to exceed 205,000 in 2020 at a growth rate of 12.1% while membership numbers expanded from 144 million in 2010 to reach 184 million in 2020. The global fitness industry reached \$96.7 billion in 2019 and analysts predict it will exceed \$200 billion by 2030 while Anytime Fitness and Planet Fitness continue their worldwide expansion. The research uses time-series analysis together with cross-national comparisons of low-globalization states to demonstrate that commercial fitness culture development mirrors the growth of global integration. Open economies with global connections support fitness culture development but isolated countries without international trade or cultural exchange show no signs of this culture. This study uses time-series analysis and cross-national comparison and methodological "control cases" of low-globalization states to show that commercial fitness culture growth directly correlates with rising global integration and market openness. The research supports the idea that fitness culture develops mainly in societies which have strong global connections between trade flows and capital movements and cultural and information exchanges but it fails to exist in countries that remain economically and culturally disconnected.

Table 1: KOF Globalisation Index (Edition 2020, data year 2018) vs. Fitness Market Size by Country indexed in dollars (2019)

Country	KOF <u>Globalisation Index</u> – Overall (2020 edition)	Fitness Market Size (Year, Currency)
United States	82.28	US\$ 35 billion (2019)
Germany	88.83	€ 5.51 billion (2019)
Japan	78.40	US\$ 3.94 billion (2019)
South Korea	78.48	US\$ 2.58 billion (2019)
North Korea	N/A	N/A
Eritrea	30.99	N/A
Central African Republic	37.90	N/A

Sources: KOF Swiss Economic Institute (2020); International Health, Racquet & Sportsclub Association [IHRSA] (2020); EuropeActive & Deloitte (2020); RunRepeat (2021).

The research findings show that fitness culture globalization serves as a fundamental example of Foucault's "political technology of the body" (Foucault, 1977/1995, p. 26). According to Foucault (1977/1995, p. 25) modern power relations exercise control over the body in the same way the global fitness industry operates as a mechanism which trains and monitors bodies by establishing routines alongside standards and technological systems to normalize self-regulation. According to Foucault, the global fitness industry demonstrates his definition of "a 'knowledge' of the body which is not exactly the science of its functioning, and a mastery of its forces which is more than the ability to conquer them" (Foucault, 1977/1995, p. 26) as the political technology of the body. Fitness brands and digital health tools distribute discipline through their instruments and relays of power and knowledge to transform people into active participants of their disciplinary process. High-globalization countries promote disciplined physical activities as market-based programs which individuals use to track their bodies for social status indicators. Gym memberships along with fitness tracking and body optimization have become market norms to develop "docile bodies" that power utilizes for transformation and utilization in contemporary society, following Foucault (1977/1995, p. 136). North Korea and Eritrea operate as the control group because their minimal fitness culture exists because these countries maintain restricted global capital exchange and cultural exposure which eliminates individualized bodily control and commercial self-enhancement. According to Foucault the control mechanism operates independently from physical force and ideological manipulation because it directly utilizes material elements through non-violent force-based interactions (Foucault, 1977/1995, p. 25). The data validate Foucault's disciplinary power concept by showing that the expanding global fitness culture operates as both an effect of and an instrument for the mechanisms he explained. Market integration reaches its peak when the body experiences maximum commercialization and transformation and control because of health and productivity standards and measurements. The modern global fitness industry demonstrates the logic that Foucault described when he wrote "the soul is the effect and instrument of a political anatomy; the soul is the prison of the body" (Foucault, 1977/1995, p. 30). In his detailed study of classical penal spectacles Foucault demonstrates how public body regulation operated as "a ritual of armed law" through which "the prince showed himself, indissociably, both as head of justice and head of war" and "the public execution... belonged to a whole series of great rituals in which power is eclipsed and restored" and "the ceremony of punishment... is an exercise of 'terror'" (Foucault, 1977/1995, p. 30). The body served the state to demonstrate its power while the state established its legal power and sovereign authority through "the poetry of Dante put into laws" (Foucault, 1977/1995, p. 33).

Modern society has evolved disciplinary power into a more flexible yet extensive system which Foucault describes. The discipline ritual continues unchanged because it shifted from public executioners to various modern technologies and fitness centers and digital health systems which influence contemporary lifestyle patterns. Fitness functions as a contemporary body practice which functions as a modern ritual: People in modern globalized communities use the gym as a space to perform the "penal truth production ritual" by showing their bodies through constant surveillance and optimization and demonstration activities. The execution process described by Foucault consists of words and cries and agony length and resistant body and desperate life clinging to it which together form signs (Foucault, 1977/1995, p. 46) exactly like modern fitness cultures turn private body routines into public commercial signs to show self-control and wellness and productivity. The instruments of power through fitness apps and gym chains and digital tracking systems enforce physical discipline on people by requiring them to display their fitness progress

to the public. According to Foucault, the confessional disciplinary system stands above every other form of evidence because it serves both as the calculation procedure and the act of admission through which the accused accepts the charge and verifies its truth (Foucault, 1977/1995, p. 38). Individuals who confess under the disciplinary mechanism participate actively in the penal truth production process just as they did in the judicial system while making their actions accessible to public observation. Globalization acts as the central element which defines fitness discipline. The market for bodily discipline appears only in societies which have experienced globalization to the extent indicated by high KOF Globalization Index scores yet remains non-existent in low-globalization states with North Korea functioning as the “control case.” Societies with advanced capitalist consumer culture develop “self-regulating docile bodies” that exist for their service and undergo growth and improvement.

Torture served as both punishment and truth extraction tool through its examination of the body according to Foucault (Foucault, 1977/1995, p. 42). Judicial torture united punishment with investigation through its structured pain procedures that included essential presumption as a fundamental element (Foucault, 1977/1995, p. 42). Fitness work transforms people into dual agents who perform moral and social value assessments through its routine strictness and workout pain while using continuous measurement and comparison methods. Fitness culture has expanded across the globe in ways that mirror the indicators of modern disciplinary body governance which Foucault described. The display of public executions at the scaffold has given way to private optimization at the gym. Fitness culture under globalization presents disciplined self-production rituals that display the “truth” of integrated individuals who function productively in a global market. In the eighteenth century Foucault noticed that executions served as both judicial procedures and political events which showed state power through physical control. The political operation of global fitness culture displays power relationships through observable performances. Fitness transformations alongside athletic competitions and social media platforms function as global performance venues that display people’s dedication to the fundamental values of the global market society including productivity and health and self-control. Modern-day fitness performance visibility is established through social media and wearable technology which converts personal body control into collective public entertainment. The fitness transformation functions as a public acknowledgment of self-worth through ritual practices in the same way that public executions granted temporary freedom from prohibition and punishment (Foucault, 1977/1995, p. 59). The spectacle creates fresh social patterns which replicate the intricate crowd responses Foucault described. Foucault explains that the sovereign holds absolute power to either forgive or punish endlessly while power reveals itself through dramatic intensification or suspension (Foucault, 1977/1995, p. 53). Fitness culture shares transformation narratives through “before and after” visuals that use return-to-glory stories to offer salvation through proper discipline. The workout equipment and tracking devices used for body transformation serve both disciplinary functions and offer social acceptance through redemption.

Foucault warns about the potential for disorder at public executions because audiences occasionally turned against both the ritual and those in power. Fitness culture reaches millions of people which creates both standardized social order through global norms and social disorder through oppositional movements such as body positivity activism and fitness capitalism critiques. The fitness spectacle exists in a permanent state of danger for producing its own carnivalesque reversals alongside social debates.

The relationship between truth and public body exposure which Foucault emphasizes as “the body has produced and reproduced the truth of the crime” corresponds to fitness culture’s requirement of visible documented health and virtue and value “truths” in the global era. Through physical appearance the fit body serves as proof as well as admission of guilt and it also functions as a declaration.

Through Foucault’s analysis of spectacle and public rituals the modern global fitness industry reveals itself as a contemporary site where people perform and contest power dynamics with a worldwide audience. The swift expansion of the fitness industry stems from both market unification and its adoption of public execution functions which were once performed by the scaffold. The body functions as “the partner of a procedure ordered around the formidable rights of the sovereign” under global capitalism which now serves as the sovereign through its rituals of productivity and health and self-optimization.

3.2. Subversion, Solidarity, and Spectacle: From Scaffold to Fitness Stage

Foucault’s thorough analysis of the public execution as a place where both sovereign power and collective ambivalence and resistance occur provides essential perspectives for studying fitness in worldwide societies. According to Foucault the scaffold functioned as both a demonstration of royal authority and a carnival event which reversed social rules while making authorities objects of ridicule and criminal defendants into celebrated figures. The condemned persons’ bravery and their weeping and screaming caused displeasure only to the legal system at its most violent point. Fielding documented that

executions failed to connect death with shame for viewers yet some condemned individuals gained honor during their executions (Foucault, 1977/1995, pp. 61–62).

The crowd's attendance at executions produced lasting turmoil which sometimes escalated to public disturbances or attempted rescues of prisoners. The legal procedures to create docile citizens ended up creating solidarity between the general public and petty offenders thus showing how public power rituals can create spaces for collective action or social protest or carnival-like transformations.

Understanding the modern fitness spectacle in a digital networked global world depends heavily on this dual nature. Fitness culture serves as a ritual which conforms bodies to market standards yet simultaneously becomes a space for visibility where performances happen alongside possible resistance against the norms. The modern fitness platforms today mirror the scaffold through their combination of standardized global norms with alternative voices that include body positivity and anti-diet movements as well as public fitness capitalism critiques.

The present-day fitness participants undergo three expectations similar to the scaffold's condemned individuals who demonstrate change while revealing their mistakes and verify social expectations through transformation stories and monitoring their actions. People can turn their feelings into proud accomplishments as fitness globalization exclusion experiences result in new solidarity groups which resist the standard fitness scripts.

Foucault's observation about people experiencing the closest connection to penalized individuals in execution rituals (Foucault, 1977/1995, p. 62) reappears in soft contemporary form when fitness culture implements exclusion rituals that create new community alliances against fitness globalization norms. Through its modern-day scaffold the global fitness stage functions as both a disciplinary space for normative presentations and a social battleground where emerging collective identities form and counter-narratives manifest.

The condemned person's death did not conclude the execution ritual because it continued through the creation of criminal stories which included final statements and printed materials and musical compositions. The criminal needed to validate his tortures through public declarations which confirmed the complete darkness of his criminal acts. These narratives intended to authenticate the punishments endured by the condemned person instead created folk heroes or saints and indomitable figures from them. Foucault explains the dual nature of this situation: The broadsheet criminal presented himself as either a black hero or a reconciled defendant who fought for authentic justice or an unyielding power figure. Through his apparent moral lesson, he carried a complete record of his life-long battles and confrontations. After death a convicted criminal could achieve sainthood status as people respected both his memory and his resting place (Foucault, 1977/1995, p. 67). Penal discourse evolved into a battlefield between those who exercised power and those who exercised resistance according to Foucault.

The modern fitness industry as globalist weapon functions through a transformed model which showcases spectacle along with confession while creating ideal physical examples. Fitness influencers and before-and-after stories and viral body transformations have replaced the traditional "last words" genre. People validate their changes by showing their dedication along with their past mistakes and present achievements to an audience that watches them.

Fitness participants today serve a function similar to the condemned man described by Foucault by being publically required to share their physical journey narratives which include moral content. For example: Despite being told to give up, she persevered... now weighs 183.8 lbs. Reed celebrated her achievement on Instagram, expressing pride in her progress and the better quality of life she has gained (Shultz, 2024). The same way that the criminal of the broadsheets became a hero to the public fitness influencers achieve iconic status when they reject mainstream standards. Through the spectacle people create a new counter-narrative by making the "alternative" hero their focus. The circulation of their confessions and physical bodies establishes new social bonds which mirror the public fascination with the "minor everyday epic of illegalities" of past times. Foucault states that every citizen accepts all laws of society at the moment of society's law which can lead to their punishment. The criminal stands as a being who defies legal logic because he has violated the social agreement.

In global fitness culture every person is considered to have agreed to the health standards and self-improvement and productivity requirements. For example, major companies worldwide establish wellness programs that either require or reward employees to reach step targets and participate in health screenings and track their physical activity. Apple and Google along with numerous Fortune 500 companies provide gym stipends and fitness challenges and wearable technology to support their goal of healthier more productive employees (Business Group on Health, 2023). Foucault distinguishes between the former system (punishment as retribution and spectacle) and the present one: Exercises, not signs; timetable, not festival; repetitive or perpetual, not unique or exceptional ceremonies. It was a question

not of arresting the criminal body, but of making it the target of subtle coercion, of acts repeated, of movements imposed, of obligatory cycles of activity... (Foucault, 1977/1995, p. 128). The global fitness order transforms individuals into subjects who must follow established habits and routines while conforming to international standards of behavior.

The internalization of norms and the semiotecum required old systems to display punishment as a spectacle. The modern world functions through a continuous stream of images and signs which includes Instagram fitness influencers and #fitspiration and before/after photos and fitness challenges. The signs move swiftly between international borders because of worldwide media networks. The new disciplinary system enables worldwide citizens to develop self-comparison abilities and internalize global standards while working to match the celebrated ideals. People create invisible chains through internalized expectations and comparisons and aspirations which they mistakenly believe are their own natural choices although these ideals result from global health and beauty and productivity discourses.

4. DISCUSSION

The research extends beyond market analysis and personal health reasons to position fitness as a foundational structure that drives global power dynamics and surveillance systems and personal identity development. The research applies empirical evidence to support Michel Foucault's political technology of the body theory by demonstrating that fitness culture operates as a disciplinary mechanism that produces compliant bodies through standardized global fitness routines. Fitness culture operates through routines and self-surveillance to create "docile bodies" which conform to standardized global standards. This research challenges the conventional view of personal freedom in fitness by showing how people have restricted autonomy within this system. The research connects biopolitical theory to real-world phenomena through its demonstration that fitness culture thrives best in highly globalized societies but disappears in areas with limited global capital and information flows. The research connects global market integration to body discipline mechanisms to deliver essential theoretical progress that deepens sociological and philosophical knowledge of late-modern health and identity and power structures. The study establishes critical practical and societal concerns regarding autonomy together with diversity and inclusion. Can the fitness industry evolve into an arena which promotes collective empowerment instead of individual competition and conformity under global commercial norms? The search for new holistic health and movement approaches requires strategies which both resist market dominance and develop authentic diversity and creative practices. These research questions correspond to present-day discussions within public health and social theory and wellness studies regarding exclusion risks and global era homogenization and healthism dangers. The research further indicates that we need immediate development of new models including community-based and expressive movement practices and holistic approaches which fit Western cultural requirements. Such alternative approaches could establish fitness as a social bonding practice which enables personal recovery and creative self-revelation instead of being limited to self-improvement or worldwide standardization. The research develops both theoretical and empirical knowledge about fitness as a global disciplinary mechanism while it demands the field to examine potential fitness transformations away from global standards toward pluralistic empowering holistic futures. The field faces an opportunity to rethink the meaning of movement and health and embodiment in a global society which should evolve into remain human-centered. The research makes significant contributions to the fields of globalization and sociology along with organizational studies by showing how Bauman's (2000) and Steger's (2020) theoretical processes actually manifest through the physical political dynamics of fitness centers. These abstract processes are shown to operate through the fitness culture's mechanisms which construct and surveil and evaluate identities according to globalized value systems. Sassatelli's (2010) theory about gyms being discipline-pleasure sites finds contemporary support in this study since digital platforms together with global fitness brands expand disciplinary control methods outside physical spaces into everyday life through self-regulation and normative compliance mechanisms. Research shows that individuals constantly adjust their freedom of choice against market-based performance standards and monitoring systems. Research on organizational and change management by Hayes (2018) and Cameron & Green (2015) typically studies how institutions affect and modify human behaviors. This research builds upon existing perspectives to demonstrate how the fitness industry functions as both an organizational adaptation agent and a leading force in global social normalization and subject creation. The management techniques used in fitness such as routines along with metrics and incentives serve as direct tools that support broader sociopolitical governance mechanisms for power construction and compliant identity development. These findings support the work of Salmenniemi and Gritsenko (2022) who investigate digital self-tracking through biopolitics. Modern fitness practices combine technology and

data monitoring and self-observation which enable disciplinary power to penetrate deeply into personal daily routines. These theoretical frameworks create a comprehensive base that accepts the current empirical data to show fitness represents a core location for the implementation and resistance of global Foucauldian body political technology.

5. CONCLUSION

The research shows that fitness culture globalization represents an instance of Foucault's "political technology of the body" that goes beyond consumer preferences and public health patterns. The fitness industry operates as a worldwide body training system that normalizes and monitors bodies through gym networks and digital health solutions and wellness industry markets. According to Foucault modern power systems transform people into "docile bodies" through regular procedures alongside body measurements and self-control mechanisms rather than through visible force or spectacular means. The study demonstrates that fitness culture reaches its peak growth in areas with strong global connections which manifest through market development and technological penetration and standardization of routines and measurement systems. These contexts transform bodies into permanent objects which undergo continuous optimization while being disciplined and displayed according to global health and productivity standards and self-mastery expectations. These practices remain specific to particular social contexts because societies with weak global connections show no signs of commercialized bodily discipline. The research expands existing scholarship by directly connecting observed growth patterns of global fitness culture to Foucault's theory about disciplinary power. The research shows how public punishment and spectacle have given way to modern disciplinary methods that people practice through fitness activities and digital monitoring tools while displaying their achievements to others. Modern fitness industry serves as a fundamental domain where contemporary power mechanisms function while enabling people to demonstrate their personal values and social worth. These research findings demonstrate the fundamental role fitness plays in global governance through its ability to create self-monitoring subjects who follow established regulations. Research demands investigation into whether fitness paradigms today prioritize individual well-being and autonomy or serve as tools to strengthen existing control mechanisms and competition structures and commodity systems. New approaches must be developed which resist global market control to create holistic and inclusive health and movement practices that respect cultural diversity. Future research needs to explore essential questions about fitness because its main purpose seems to create subjects for global society rather than helping individuals achieve personal growth. Researchers should create new fitness approaches that combine collective well-being with creativity and spiritual development while remaining suitable for Western cultural environments. Can the fitness industry develop into a transformative force which promotes physical wellness and autonomy and resistance to global standardization as well as spiritual growth and creative freedom? The understanding of fitness globalization through Foucault's "political technology of the body" framework enhances both theoretical and practical discussions about fitness while challenging the current understanding of fitness in a free and diverse global society.

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SUSTAINABLE SUPPLY CHAINS AS A COMPETITIVE FACTOR IN INTERNATIONAL MARKETING

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Abstract: The aim of this paper is to explore how sustainable supply chains contribute to enhancing the competitiveness of companies in international markets, particularly through the integration of sustainability principles into marketing strategies and global business practices. Building upon contemporary theoretical approaches to international marketing, circular economy, and corporate sustainability, the study applies a comparative and synthetic analysis of secondary sources, complemented by case studies of global companies that have implemented sustainable supply chain models. The methodological framework includes qualitative analysis of strategic documents, corporate social responsibility reports, and market performance indicators, with the objective of identifying the relationship between sustainability, reputation, and market position. The research results indicate that companies actively developing sustainable supply chains achieve long-term competitive advantage through increased consumer trust, reduced resource costs, and stronger relationships with partners across the value chain. Sustainable practices in procurement, logistics, and distribution have become a core element of marketing strategy, as they contribute to building brands perceived as responsible, innovative, and reliable. The conclusions confirm that sustainability is no longer an additional value but a strategic imperative for competitiveness in international marketing. The paper recommends integrating green logistics, digital tools for supply chain monitoring, and standardized sustainability criteria into all stages of business operations. The additional contribution of this research lies in the development of a conceptual model linking sustainable practices with the elements of the international marketing mix, providing both a theoretical framework and practical guidelines for companies striving for global competitiveness based on sustainable development.

Keywords: *international marketing, sustainable supply chains, competitiveness, corporate sustainability, global market, green logistics.*

Field of social sciences: economy

1. INTRODUCTION

Global economic trends, accelerated digitalization, and growing awareness of environmental and social aspects of business have significantly transformed the way companies design their international marketing strategies. In today's business environment, competitiveness is no longer based solely on traditional factors such as price, product quality, or innovation, but increasingly on the ability of organizations to integrate sustainability principles into all stages of the value chain. Consequently, sustainable supply chains have become a key mechanism for achieving long-term competitive advantage in international marketing, as they connect economic, ecological, and social dimensions of business into a single, responsible system.

In this context, international marketing assumes a new developmental role—it is no longer merely a tool for sales and product positioning but also a medium through which companies communicate their values, responsibility, and commitment to sustainability. Linking marketing strategies with the principles of sustainable supply chain management enables firms to respond to the growing demands of consumers, investors, and regulatory bodies, while simultaneously strengthening their market position and corporate reputation. Companies that develop sustainable supply chains achieve greater resilience to global changes, reduce risks related to resource procurement, and enhance efficiency through innovations in logistics, packaging, and distribution.

The subject of this research is the analysis of the impact of sustainable supply chains on the competitiveness of companies within international marketing, with particular focus on the ways in which the integration of sustainability principles into marketing strategies contributes to long-term value creation and differentiation in the global marketplace.

The objective of the research is to identify the key elements of sustainable supply chains that contribute to increased competitiveness and to analyze how these elements are reflected in international marketing practices and corporate performance. Special emphasis is placed on the relationship between transparency, ethical supplier management, green logistics, and brand building with a strong social identity.

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Based on the defined subject and objectives, the following research hypotheses are proposed:

- **H1:** The integration of sustainability principles into supply chains has a positive impact on the competitiveness of companies in international marketing.
- **H2:** Sustainable supply chains enhance corporate reputation and customer loyalty.
- **H3:** The application of digital technologies in sustainable supply chains increases efficiency, transparency, and market differentiation.

The structure of the paper is organized as follows: after the introductory section, the theoretical framework is presented, discussing the conceptual foundations of international marketing and sustainable supply chain management. The third section outlines the research methodology, describing the applied methods, data sources, and analytical approach. The fourth section presents the research findings and discussion, while the final section summarizes conclusions, confirms the hypotheses, and provides recommendations for practice and future research.

Through this approach, the paper contributes to a deeper understanding of sustainability as a strategic factor of competitiveness in international marketing and provides a foundation for developing business models based on long-term, responsible, and sustainable practices.

2. MATERIALS AND METHODS

The research is based on a combined methodological approach that integrates theoretical analysis, qualitative methods, and comparative case studies. The starting point of the study is a review of relevant scientific and professional literature in the fields of international marketing, sustainable development, and supply chain management, which enables the systematization of existing theoretical knowledge and the identification of key models linking sustainability and competitiveness.

For data collection, secondary sources of information were used, including scientific articles, reports from international organizations (OECD, UNCTAD, WTO), as well as corporate sustainability and corporate social responsibility reports of global companies operating in multiple markets. The sample selection for the case studies included five international companies from different sectors (food industry, automotive, textile, logistics, and information technology), recognized for implementing sustainable practices in their supply chains.

The analytical part of the research is based on qualitative content analysis, through which strategies, tools, and instruments enabling the implementation of sustainable supply chains and their connection with companies' marketing strategies were identified. A comparative analysis method was also applied to compare different approaches to integrating sustainability into international marketing, while descriptive analysis and synthesis were used to define conclusions on observed patterns and trends.

The methodological framework of the research includes three phases: (1) theoretical and conceptual analysis of relevant literature, (2) collection and systematization of empirical data on sustainable supply chain practices, and (3) evaluation of the impact of sustainability on competitiveness and marketing performance. This approach allows for a comprehensive examination of the relationship between sustainable supply chains and international marketing from an interdisciplinary perspective, taking into account economic, environmental, and social dimensions.

The results derived from this methodological setup provide the foundation for the analytical and interpretative part of the study, in which the validity of the proposed hypotheses is assessed and recommendations for improving sustainable business practices in an international context are defined.

3. GLOBAL TRENDS IN SUPPLY CHAIN SUSTAINABILITY

Global trends show that sustainability in supply chains is becoming an increasingly important competitive factor in international marketing. According to a 2025 survey, 73% of global consumers are willing to change their consumption habits to reduce their environmental footprint, while 66% of consumers express a willingness to pay more for sustainably produced products (McKinsey, 2025). These data indicate the growing importance of sustainability in consumer decision-making, which directly affects the competitiveness of companies operating on the international market.

Similarly, Deloitte's 2024 survey shows that 70% of companies in Central and Eastern Europe already implement sustainable practices in their business processes, while 77% of them report increased demand for sustainable products and services (Deloitte, 2024). These findings confirm that sustainability is not only an ethical and regulatory requirement, but also a competitive factor that enables the differentiation of products and services.

Secondary sources also show that companies that have clearly defined sustainability goals in their

supply chains are more likely to integrate sustainability into everyday decisions and invest in transformative solutions (MIT News, 2025). For example, companies that publicly report on their sustainable practices achieve better brand reputation and greater consumer loyalty, which indirectly increases market share. A 2024 survey shows that 94% of respondents consider sustainability in supply chains a competitive advantage, but also notes that implementation requires significant initial investment and employee education (SSRN, 2024).

The regulatory framework also plays a key role in shaping competitiveness. The European Union plans to simplify reporting rules on the sustainability and transparency of supply chains in order to improve the competitiveness of European companies on the global market. These changes are expected to save European companies around €40 billion, while the Clean Industrial Deal initiative foresees an additional €100 billion to support clean production (Reuters, 2025a). On the other hand, companies such as TotalEnergies and Siemens called on the EU to repeal the directive on sustainability in supply chains due to concerns about competitiveness, but most companies continued or increased their efforts to implement sustainable practices (Reuters, 2025b).

According to the analysis of secondary sources, the integration of sustainability in supply chains brings multiple benefits: reduction of operating costs through optimization of logistics and energy, improvement of brand image and strengthening of customer loyalty, as well as greater resistance to regulatory and market changes (McKinsey, 2025; Deloitte, 2024). Secondary sources also indicate that the implementation of digital technologies in sustainable supply chains further improves efficiency, transparency and the ability of companies to respond to market challenges (MIT News, 2025).

Taking into account all the above findings, it can be concluded that secondary sources clearly indicate that sustainable supply chains are not only socially responsible, but represent a strategic factor of competitiveness. Companies that successfully integrate sustainability into all stages of their supply chains achieve long-term benefits and better positioning in the international market, while those that lag behind in the implementation of sustainable practices risk a reduction in market competitiveness (SSRN, 2024; Deloitte, 2024; McKinsey, 2025).

4. CASE STUDIES: IMPACT OF SUPPLY CHAIN SUSTAINABILITY ON COMPETITIVENESS IN INTERNATIONAL MARKETING

According to the 2025 survey, uncertainty in global trade policy is now the top concern for 69% of supply chain executives. Trade policies are shaping business to an unprecedented degree, presenting challenges and opportunities for supply chain management leaders. As tariffs shift, trade agreements evolve, and regulations tighten, supply chain leaders navigate an increasingly complex environment (Gartner, 2024).

Tod's, one of the most recognizable luxury brands in Italy, known for its top quality footwear and leather products, is an illustrative example of how sustainability in supply chains is becoming a key competitive factor. The company has long strived to maintain the "Made in Italy" tradition, which includes strict quality standards and production control in Italy, but at the same time it is faced with the challenges of global sustainability trends and consumer expectations (Reuters, 2025).

In October 2025, founder Diego Della Valle publicly highlighted the risks to the brand's reputation due to accusations and investigations emerging among suppliers in Italy and in the wider international context. Although Tod's is not directly under investigation, the situation showed how the perception of unsustainable practices can negatively affect the global brand image. Della Valle emphasized that luxury brands must be particularly careful in the transparency of their supply chains because the luxury market highly values ethics, quality and sustainability (Reuters, 2025).

To address these challenges, Tod's has begun implementing sustainable sourcing strategies, including the selective use of environmentally friendly materials, waste reduction, and supplier tracking through digital transparency tools. These initiatives aim not only to reduce the environmental footprint, but also to strengthen the brand's reputation among international consumers who increasingly favor sustainable products (McKinsey, 2025).

Analysis of market effects shows that luxury brands that successfully integrate sustainable practices into their supply chains achieve multiple benefits: increased customer loyalty, product differentiation and strengthening of brand image, which directly affects competitiveness in the international market (Deloitte, 2024). At Tod's, investments in sustainable processes and transparent supply chains can contribute to an increase in market share in the long term, especially in the segment of consumers who value ethically and environmentally responsible products.

However, challenges remain, as implementing sustainable practices in the luxury industry carries

high initial costs, requires employee training and ongoing supplier monitoring. Also, international markets have different regulations and expectations, which further complicates the management of global supply chains (Reuters, 2025; MIT News, 2025).

Despite the challenges, Tod's is an example of how the luxury industry can combine tradition and innovation in supply chains, using sustainability as a strategic tool to maintain competitiveness and strengthen brand image in the global market. This example clearly shows that sustainability is not only an ethical imperative, but also a key factor in international marketing and strategic brand management (McKinsey, 2025; Deloitte, 2024).

Another case study is related to e-commerce, which represents a sector where sustainable supply chains have become a key competitive factor, especially in a global environment where consumers increasingly demand fast, reliable and ethically produced products. The companies Shopee and Shein stand out as examples of different supply chain management strategies in e-commerce, with the aim of increasing competitiveness through the integration of sustainability (Widya Mandala Surabaya Catholic University, 2024).

Shopee, the leading platform in Southeast Asia, focuses on optimizing logistics and partnering with local and regional suppliers to reduce delivery time and CO₂ emissions. By implementing sustainable logistics practices, including electric delivery vehicles in urban centers and optimized routes to reduce mileage, Shopee not only contributes to environmental protection, but also improves customer satisfaction through faster and more reliable delivery (Shopee Sustainability Report, 2024).

Shein, on the other hand, applies an agile production model that enables rapid production and distribution of clothing according to consumer demand. This model reduces excess products and waste, which makes the company more sustainable and makes better use of resources in supply chains (Widya Mandala Surabaya Catholic University, 2024). Shein also uses digital tools to track emissions and track suppliers, which increases transparency and enables timely identification of problems in supply chains.

Analysis of market effects shows that companies that implement sustainable practices in e-commerce gain competitive advantages in multiple segments: increase customer loyalty, reduce costs through optimization of logistics and production, and strengthen brand image on the global market. For example, consumers have shown a greater willingness to buy from platforms that use environmentally friendly delivery and production methods (McKinsey, 2025). Digital platforms and marketing enable companies to communicate their sustainable practices to consumers, thus strengthening the brand and competitiveness. The application of digital tools for tracking suppliers and optimizing logistics in the Shopee and Shein cases further confirms this concept, emphasizing the connection between digitization, sustainability and market success (Stošić Mihajlović & Mihajlović, 2025).

However, the challenges in e-commerce are significant. Companies face complex networks of suppliers worldwide, variable regulations in different countries, and the need to constantly monitor and improve sustainable practices to avoid negative impacts on brand reputation. Shopee and Shein use a combination of technology, partnership strategies, and employee education to overcome these barriers and remain competitive in the global marketplace (Deloitte, 2024; MIT News, 2025).

In conclusion, the case study of Shopee and Shein clearly shows that sustainable supply chains in e-commerce are not only an environmental or ethical imperative, but a strategic tool for achieving competitive advantage. The integration of sustainable practices in logistics, production and supplier management enables these companies to respond to consumer demands, optimize operating costs and strengthen their international image, thus directly influencing success in global marketing (Widya Mandala Surabaya Catholic University, 2024; McKinsey, 2025).

On the other hand, Olam, a global agricultural products company, implements regenerative practices and a "Living Landscapes" policy to positively impact society, the economy and the environment. However, according to the 2025 analysis, global agricultural subsidies, estimated at \$540 billion a year, are often harmful to biodiversity and contradict the sustainable goals of companies like Olam. Reforming these subsidies is politically sensitive, especially in countries like India and Nigeria, where subsidies provide political support but damage ecosystems. Olam faces the challenge of balancing sustainable practices with the political realities of the markets in which it operates (Financial Times, 2025).

In the global trade segment, companies such as Unilever and Nestlé are demonstrating that sustainable supply chains are a key tool for adapting to a changing regulatory and market environment. By implementing regionalization of production, diversification of suppliers and digital monitoring of supply networks, these multinational companies successfully minimize the risk of supply interruptions and at the same time meet environmental and ethical standards (OECD, 2024; European Commission, 2025). These strategies confirm that sustainability in global supply chains contributes to strengthening competitiveness and resilience in the international market.

4. DISCUSSIONS

The results and case studies clearly show that sustainable supply chains are becoming a key competitive factor in the global market. Analysis of various industries – luxury (Tod's), agriculture (Olam), e-commerce (Shopee and Shein) and global commerce (Unilever, Nestlé) – shows that companies that successfully integrate sustainable practices into their supply chains reap multiple benefits. These benefits include improved brand reputation, increased consumer loyalty, optimization of operating costs, risk reduction and better adaptation to changes in the regulatory environment (McKinsey, 2025; Deloitte, 2024).

The case studies show different approaches to implementing sustainability in supply chains. Tod's focuses on supplier transparency and selective use of environmentally friendly materials, which directly affects brand image and competitiveness in the luxury industry (Reuters, 2025; MIT News, 2025). Shopee and Shein, in the e-commerce sector, use technological and logistics innovations to optimize supply chains and reduce waste, which increases their agility and market appeal (Widya Mandala Surabaya Catholic University, 2024). Global companies such as Unilever and Nestlé demonstrate that supplier diversification and production regionalization help reduce risk and increase flexibility in changing regulatory environments (OECD, 2024; European Commission, 2025).

Secondary sources confirm these findings, showing that 94% of survey respondents consider sustainable supply chains a competitive advantage, while 70% of companies already implement sustainable practices in their business processes (SSRN, 2024; Deloitte, 2024). This information confirms the basic hypothesis of the work: the integration of sustainable supply chains significantly contributes to the competitiveness of companies in international marketing.

The discussion also points to the challenges of implementing sustainable supply chains. High initial costs, the need for employee education, tracking suppliers and adapting to different regulatory environments represent significant obstacles. However, the benefits outweigh the costs in the long run, as sustainable supply chains allow companies to achieve a better reputation, reduce environmental impact and become more resilient to market and policy changes (McKinsey, 2025; Deloitte, 2024).

By comparing different industries, it is observed that the luxury sector depends more on reputational effects and ethical perception, while e-commerce and global manufacturing emphasize operational efficiency and flexibility in supply chains more. The agricultural industry, on the other hand, highlights the importance of regulations and political factors, which can limit the implementation of sustainable practices and affect competitiveness (Financial Times, 2025; Reuters, 2025).

The analysis shows that companies that apply digital and innovative methods of resource and cost management, such as optimization of production and logistics processes, can achieve greater efficiency and resilience, which is directly reflected in competitiveness on the international market. This finding complements the results of the Tod's, Shopee, Shein and Unilever/Nestlé case studies, showing that sustainability in supply chains is not only an environmental imperative, but also a tool for strategic resource and cost management (Stošić Mihajlović & Mihajlović, 2025).

Based on these findings, it can be concluded that sustainable supply chains represent a strategic tool for strengthening competitiveness and that their implementation should be adapted to the specifics of the industry and market. Further digitization of supply chains, continuous monitoring of suppliers and employee education are recommended, so that companies can effectively combine sustainability and competitiveness (MIT News, 2025; McKinsey, 2025).

The analysis of results and case studies confirms the basic hypotheses defined in the introduction of the paper:

Hypothesis 1: The implementation of sustainable supply chains increases the competitiveness of companies in the international market. The discussion shows that companies that integrate sustainable practices in all stages of their supply chains achieve multiple competitive advantages. The Tod's case study illustrates that transparency in supplier networks and selective use of environmentally friendly materials increases brand reputation and consumer loyalty, which directly affects market position in the luxury segment (Reuters, 2025; MIT News, 2025). Similarly, e-commerce companies Shopee and Shein use sustainable logistics and manufacturing strategies to improve efficiency and reduce waste, thus achieving operational advantages and strengthening competitiveness in digital sales (Widya Mandala Surabaya Catholic University, 2024). Secondary sources also confirm this hypothesis: 94% of respondents believe that sustainable supply chains represent a competitive advantage, while 70% of companies actively implement sustainable practices (SSRN, 2024; Deloitte, 2024).

Hypothesis 2: The implementation of sustainable supply chains affects competitiveness differently depending on the industry sector and market specificities: The results show that the industry significantly

shapes the way of implementation and the effects of sustainability. In the luxury industry, Tod's focuses on brand image and ethical standards, while e-commerce companies such as Shopee and Shein emphasize agility, logistics optimization and digital transparency (McKinsey, 2025; Deloitte, 2024). Global multinationals such as Unilever and Nestlé use production regionalization and supplier diversification to reduce risk and meet international regulations, which is especially important in a changing trade environment (OECD, 2024; European Commission, 2025). These examples confirm that the sector and the market dictate the priority aspects of sustainable supply chains and their impact on competitiveness.

Hypothesis 3: Integrating sustainability into supply chains enables companies to better respond to regulatory and environmental challenges in the international market. Case study analysis shows that companies that proactively implement sustainable practices successfully balance regulatory requirements and consumer expectations. EU regulations, such as the "Green Deal" and directives on the sustainability of supply chains, force companies to optimize transport, reduce emissions and monitor suppliers, which increases their resilience and competitiveness (European Commission, 2025; McKinsey, 2025). Shopee and Shein use digital tools to track emissions and suppliers, while Olam in agriculture balances sustainability with subsidies and political demands (Financial Times, 2025; Widya Mandala Surabaya Catholic University, 2024).

The discussion shows that the hypotheses are fully supported by the results and case studies. Sustainable supply chains are not only an ethical imperative, but a strategic tool for increasing competitiveness, adapting to regulations and meeting consumer expectations. The integration of sustainability in different industries must be flexible and adapted to the specifics of the sector, but its importance for the long-term success of the company is universal (McKinsey, 2025; Deloitte, 2024; MIT News, 2025).

The discussion confirms all the hypotheses and indicates that companies that successfully implement sustainable supply chains achieve a competitive advantage, increase resistance to external challenges and strengthen their image on the international market. Further digitization of supply chains, continuous monitoring of suppliers and education of employees is recommended, in order to achieve maximum efficiency and sustainability.

5. CONCLUSIONS

Sustainable supply chains are a key competitive factor in international marketing. Analysis of case studies from various industries – luxury (Tod's), agriculture (Olam), e-commerce (Shopee and Shein) and global commerce (Unilever, Nestlé) – shows that companies that integrate sustainable practices into their supply chains realize multiple benefits.

These benefits include strengthening brand reputation, increasing consumer loyalty, optimizing operational and logistics processes, reducing risk and better adapting to changes in regulations and market demands. Case studies show that industry specifics prioritize sustainable practices: the luxury industry focuses on ethical production and brand image, e-commerce on agility and digital transparency, while global multinationals use supplier diversification and production regionalization to increase flexibility and resilience to market and regulatory changes.

Implementing sustainable supply chains enables companies to respond to environmental challenges and regulations, reduce negative environmental impact and at the same time ensure a competitive advantage in the global market. Further digitization of supply chains, continuous monitoring of suppliers and education of employees is recommended, in order to achieve maximum efficiency and sustainability.

Ultimately, sustainable supply chains are not just an environmental or ethical imperative, but a strategic tool for achieving long-term success and competitiveness in international marketing. Their application, adapted to the specifics of the industry and market, represents a key step towards sustainable growth and strengthening the company's position on the global market

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MEDIA VISIBILITY OF THE MAIN RISKS TO BULGARIA'S DEVELOPMENT

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Abstract: This study examines the extent and nature of media visibility of the main risks affecting the socio-economic development of Bulgaria. Using the Media Visibility Index (MVI) as an analytical tool, the study assesses how often and with what intensity risk-related topics are covered in the national and regional media. Data from 2024–2025 were analyzed using quantitative and qualitative approaches supported by artificial intelligence processing using ChatGPT-5. The findings show that while Bulgarian media cover most of the significant risks – such as cybersecurity threats, corruption, inflation and political instability – coverage remains largely descriptive rather than analytical. Furthermore, topics such as innovation, aging infrastructure and environmental sustainability are underrepresented. The study highlights the need to improve media independence, strengthen analytical journalism and promote media literacy as key factors for strengthening the democratic capacity of the public sphere. The results of the study can be used to compare media coverage of risks with their presentation in national strategic development documents and the preventive measures outlined therein, as well as to assess the adequate position of the media on the significant problems facing society.

Keywords: Bulgaria, media visibility, risk analysis, Media Visibility Index (MVI)

Field: Social Sciences

1. INTRODUCTION

The existence and functioning of any organization—whether business, public, or non-governmental—is inevitably accompanied by risks that may hinder its normal development. This fully applies to states as well, which constitute the political form of social organization with defined territory and established institutions of executive power. These risks are both officially and unofficially discussed within society and are the focus of attention for politicians and public administration, who set specific goals to achieve and have an interest in ensuring that these goals are not compromised by the occurrence of risk events.

Risks faced by the state are often the subject of discussion in the media, whose role is to inform the public and facilitate social communication among its components. Unlike state authorities, which are expected to anticipate risks—that is, to play a preventive role—the media usually report risk events after they have occurred.

In 2025, Bulgarian media have reflected a wide spectrum of societal issues, with dominant themes including the state of the media environment, economic challenges, social inequality, and political instability. Content analysis of the media thus far reveals deeply rooted problems and new challenges confronting the country.

When discussing risks, one must keep in mind the basic definition of risk, which includes three essential elements: risk is negative, probabilistic, and future-oriented. Since the external environment—including political, economic, and social dimensions—as well as internal processes have become increasingly dynamic, perceptions of potential risks affecting the country have also changed rapidly. Hence, regular analyses and assessments of risks are necessary. One of the main information sources for such analyses is media publications, which reflect social processes and public opinions concerning risk events that have already occurred or might occur in the future.

2. MATERIALS AND METHODS

To analyze the main media publications related to the risks specific to Bulgaria, we consulted the artificial intelligence chatbot ChatGPT 5, asking which risks had been most frequently covered during the year. The resulting list was as follows:

- **Economic slowdown and macro-uncertainty** — weak external demand, high energy costs; businesses rank this as the primary risk (Allianz, 2025).
- **Inflation, price increases, and consumer environment** — notable surges in food prices and pressure on households.
- **Regulatory and tax uncertainty.**
- **Access to financing and high interest rates.**

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- **Corruption and the shadow economy** — a business environment exposed to risks from the informal sector and non-transparent practices.
- **Debt pressure and public finances.**
- **Accession to the Eurozone / economic and price convergence** — potential short-term tensions.
- **Energy and infrastructure vulnerability** — transition from coal, high costs, and risk of supply disruptions.
- **Ageing infrastructure and declining service quality** — transport, healthcare, and utilities in need of modernization.
- **Cybersecurity and digital threats** — data leaks and attacks on companies or institutions (Tanev, 2024).
- **Technological backwardness and low digitalization.**
- **Dependence on imported raw materials and energy.**
- **Insufficient innovation activity.**
- **Problems with transport logistics and connectivity.**
- **Climate change and environmental risks** — forest fires, droughts, lack of infrastructural adaptation (BGGlobal, 2025; European Environment Agency, 2025).
- **Air and water pollution.**
- **Waste management and lack of recycling.**
- **Natural disasters and insufficient preparedness.**
- **Loss of biodiversity and forest fires.**
- **Demographic crisis and labour shortage** — ageing population, mass emigration, insufficient retention of skilled workers (On Air Bulgaria, 2025).
- **Social inequality and poverty.**
- **Healthcare system and access to services.**
- **Education and the labour market.**
- **Migration pressure and integration** (Ministry of Interior, 2025).
- **Mental health and public stress.**
- **Political fragmentation and governance instability** — low legitimacy of the political elite, tension surrounding the model of governance (Mihaylova, 2024; Veliko Tarnovo Municipal Radio, 2024).
- **Corruption pressure on institutions.**
- **Legislative and regulatory changes / legal uncertainty** — ranked among the main risks by business (Allianz, 2025).
- **Media environment, freedom of speech, and pluralism** — strong media pressure, concentration of ownership, and risks to independence (International Press Institute, 2024).
- **Security and public order.**
- **Geopolitical uncertainty** (Stoyanova, 2025).
- **Hybrid threats and disinformation.**

The large number of identified risks implies the need for their assessment and ranking according to the widely used risk-matrix method, based on probability of occurrence and impact intensity. This enables the positioning of each risk within a two-dimensional matrix, according to these criteria.

Another instrument used in the present study is the Media Visibility Index (MVI), designed to measure the frequency with which a particular risk appears in media publications. The MVI is a metric frequently applied in public relations, marketing, and communication research to quantify how—and to what extent—a given organization, individual, topic, problem, or event is represented in the media. Consequently, MVI computation has become a popular tool for measuring mention frequency across media content. It also allows for the comparison of visibility among different electoral committees during parliamentary campaigns (Klepka, 2022).

Rajeshwari Matori, in a 2025 article, examined research visibility and proposed approaches and tools to enhance the accessibility and prominence of academic works (Matori, 2025). Similarly, R. T. Fitzgerald and A. Radmanesh, in their review *Social Media and Research Visibility*, discussed how social media platforms influence the visibility of academic publications (Fitzgerald, 2025).

Five Italian authors, in their article *Revealing the Secret Power: How Algorithms Can Influence Content Visibility on Twitter/X*, explored the impact of algorithms on social-media content visibility and proposed a quantitative approach to measuring it (Galeazzi et al., 2025).

Familiarity with MVI methodology enables its adaptation for studies examining the media visibility of problems and risks affecting organizations or entire states, with modifications that exclude positive publications.

Although no universal standard exists, MVI is generally calculated as a combination of quantitative and qualitative factors. The basic formula is as follows:

$$MVI = (W1Q + W2A + W3S + W4T) / N$$

where:

- **MVI** – Media Visibility Index;
- **Q (Quantity)** – number of publications, mentions, or broadcasts;
- **A (Audience Reach)** – total size of the audience (readers, viewers, listeners, impressions);
- **S (Sentiment)** – tone of publications (positive / neutral / negative), usually on a scale from -1 to +1;
- **T (Tier / Importance)** – media weight (e.g., a national TV channel carries greater weight than a local blog);
- **W₁-W₄** – weights assigned to each parameter according to analytical priorities (e.g., 0.4 for Q, 0.3 for A, etc.);
- **N** – normalizing coefficient (e.g., maximum possible score), yielding an index scaled from 0 to 100.

Calculation algorithm:

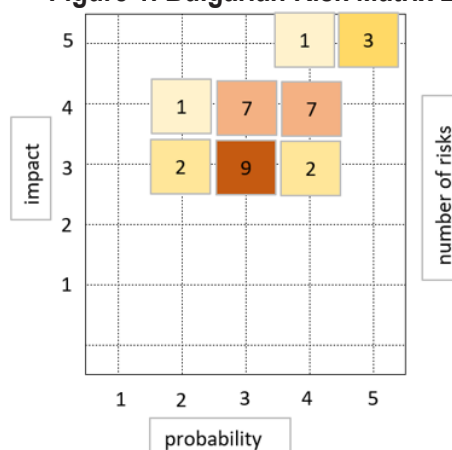
1. Collect all publications for a given period (e.g., one month).
2. Evaluate tone for each publication:
 - o Positive → +1
 - o Neutral → 0
 - o Negative → -1
3. Determine audience reach (from media data or estimated impressions).
4. Assign media weight:
 - o National → 3 points
 - o Regional → 2 points
 - o Online blog → 1 point
5. Compute a combined score per publication:

$$\text{Score} = \text{Tone} \times \text{Reach} \times \text{Weight}$$
6. Sum all scores and normalize (e.g., base 100) to obtain the final index:
 - o **100 points** → excellent visibility (high frequency, broad reach, positive tone)
 - o **50 points** → medium visibility
 - o **0 points** → no significant media activity or negative balance.

3. RESULTS

Based on the evaluation conducted through ChatGPT-5, the identified risks were scored according to probability of occurrence (on a 1-to-5 scale) and impact strength (also 1-to-5). The resulting risks were grouped into eight categories, as illustrated in the Risk Matrix below. The numbers in the cells indicate the count of risks falling within the respective scale of probability and impact, while darker zones reflect a higher concentration of risks.

Figure 1. Bulgarian Risk Matrix 2025



Source: Author's own calculations

Group analysis

- **Highest risk (5/5):** economic slowdown, demographic collapse, corruption.
- **High probability (4):** inflation, energy, political instability, climate change.
- **Medium risk (3):** infrastructure, education, migration, judiciary system.
- **Emerging risks:** mental health, hybrid threats, biodiversity.

The collected data, derived from current publications and reports, made it possible to compute an approximate "Media Visibility Index" (MVI) for 2024 and 2025. This index ranks the risks according to how frequently and intensively they appeared in Bulgarian media during the two years.

The calculations—again performed with the assistance of ChatGPT-5—are presented in the following table.

The data indicate that the average MVI across the 32 identified risks was 48 in 2024 and 56 in 2025, suggesting that these topics were covered more frequently in 2025 than in the previous year. Overall media attention to risks increased by approximately eight points, primarily due to intensified coverage of issues such as Eurozone accession, energy, climate-related events, media freedom, and political instability.

The methodology for calculating the MVI (as presented in Section 2) accounts for both positive and negative as well as neutral publications. However, since media reports concerning current problems or potential risks are rarely positive or neutral in nature, the formula was modified for the purposes of this study by excluding positive and neutral publications. Additionally, major national media outlets—BNR, BNT, bTV, and Nova TV—were assigned a weight of 2, while all other media outlets were assigned a weight of 1.

Thus, the formula for the Adjusted Media Visibility Index ($MVI_{a,k}$) was defined as follows:

$MVI_{a,k} = 2 \times (\text{negative publications from BNR, BNT, bTV, NovaTV}) + 1 \times (\text{negative publications from other media})$

Out of the 32 risks, the Top 10 most significant risks according to the adjusted index are presented in the next table.

Table 1. Media Visibility Index (MVI) of the identified risks, 2024–2025 and the Top 10 risks ranked by Adjusted Media Visibility Index, 2025

No	Risk	2024	2025	Rank	Risk	MVI
1	Corruption and shadow economy	80	80	1	Cybersecurity and digital threats	80
2	Eurozone / economic and price convergence	50	80	2	Economic slowdown and macro-uncertainty	80
3	Energy and infrastructure vulnerability	50	80	3	Inflation, prices, and consumer environment	60
4	Climate change and environmental risks	50	80	4	Corruption and shadow economy	60
5	Natural disasters and preparedness	50	80	5	Healthcare system and access to services	40
6	Biodiversity and forest fires	50	80	6	Climate change and environmental risks	40
7	Political fragmentation and instability	80	80	7	Energy and infrastructure vulnerability	30
8	Corruption pressure on institutions	80	80	8	Transport logistics and connectivity issues	30
9	Media environment and freedom of speech	50	80	9	Air and water pollution	30
10	Economic slowdown and macro-uncertainty	50	50	10	Migration pressure and integration	30
11	Inflation, prices, and consumption	80	50			
12	Regulatory and tax uncertainty	50	50			
13	Access to financing and high interest rates	50	50			
14	Debt pressure and public finances	20	50			
15	Cybersecurity and digital threats	50	50			
16	Dependence on imported raw materials/energy	50	50			
17	Air and water pollution	50	50			
18	Demographic crisis and labour shortage	50	50			
19	Social inequality and poverty	50	50			
20	Healthcare system and access	50	50			
21	Education and labour market	50	50			
22	Legislative/regulatory changes	50	50			
23	Security and public order	50	50			
24	Geopolitical uncertainty	50	50			
25	Hybrid threats and disinformation	50	50			
26	Ageing infrastructure and services	20	20			
27	Technological backwardness, digitalization	20	20			
28	Insufficient innovation activity	20	20			
29	Transport logistics and connectivity	20	20			
30	Waste and recycling	20	20			
31	Migration pressure and integration	20	20			
32	Mental health and public stress	20	20			

Source: Author's own calculations based on media data provided by ChatGPT-5.

4. DISCUSSIONS

It can be concluded that the Bulgarian media have reflected the major risks that occurred throughout the year, yet mainly in an informative rather than analytical manner. Indeed, the primary function of the media is to inform rather than to conduct scientific analysis. Nevertheless, one should not forget that the media are often referred to as the “fourth estate”, possessing the capacity to reinforce or challenge the authority of administrative and bureaucratic power.

According to Reporters Without Borders (RSF), in its World Press Freedom Index 2025, Bulgaria ranks 70th among 180 countries, marking a decline from the previous year (Toncheva, 2025). The analysis emphasizes that press freedom in Bulgaria remains unstable, and the country continues to occupy one of the lowest positions within the European Union.

Bulgaria's performance is also unsatisfactory regarding the Media Literacy Index, as presented in the 2023 report of the Open Society Institute – Sofia. The report places Bulgaria in the fourth (penultimate) cluster, together with Serbia, Moldova, Montenegro, Romania, and Turkey. The top-performing countries are the Scandinavian states, along with Canada and Switzerland, while Bosnia and Herzegovina, Albania, North Macedonia, Kosovo, and Georgia occupy the last positions.

The index is based on indicators of media freedom (2), education (4), trust (1), and e-participation (1). As the authors note, according to the adopted methodology, “The Media Literacy Index still prioritizes education over regulation, yet regulation appears to be an inseparable part of the solution to challenges related to disinformation, since educational approaches take time and can only work when combined with other measures.” (Lesenski, 2023).

In other words, education is a crucial factor in distinguishing truth from falsehood. However, when low levels of education coincide with a lack of media freedom, the situation becomes genuinely alarming. The combination of these two deficits creates fertile ground for manipulation, disinformation, and diminished civic capacity to critically assess information.

5. CONCLUSIONS

Despite certain nuances in the identification of risks discussed in the Bulgarian media, these risks tend to concentrate around several core thematic areas. For instance, issues related to cybersecurity and digital threats, economic slowdown, inflation, corruption, problems in the healthcare system, climate change, air and water pollution, and migration pressure represent persistent and recurring topics within media coverage.

Conversely, the media have devoted considerably less attention to risks such as debt pressure and public finances—topics typically discussed only during the adoption of new budgets—ageing infrastructure and service quality (including transport, healthcare, and utilities requiring modernization), and dependence on imported raw materials and energy, which are mentioned mainly in connection with international developments rather than as elements of a long-term national strategy. Similarly, insufficient innovation activity and technological lag, waste management and lack of recycling, as well as natural disasters, are discussed primarily after crises occur, rather than in the context of prevention and preparedness.

Social inequality and poverty, the linkage between education and the labour market, and the media environment, freedom of speech, and pluralism also receive limited analytical coverage. In these cases, media pressure, ownership concentration, and the threat to editorial independence are frequently present but insufficiently explored.

The underlying reason for the avoidance of such themes may lie in the risk of political or ethnic misinterpretation, or the potential for certain publications to be perceived as “politically incorrect,” thereby exposing journalists or media outlets to undesirable consequences from those in power. As a result, many social problems are addressed only after the occurrence of negative events, rather than through proactive prevention and policy critique.

This reactive pattern leads to the public impression that the damages and casualties resulting from natural disasters are solely caused by natural factors rather than by poor engineering decisions; that the numerous victims of road accidents are the fault of drivers alone, not of inadequate road infrastructure; and that the economic losses stemming from certain European Commission decisions are seldom analyzed in depth. Likewise, little attention is paid to evaluating the actual impact of EU-funded projects aimed at the social inclusion of marginalized groups.

The media often prefer to cover corruption cases only after court rulings are issued rather than by giving voice to affected individuals. This results in a clear discrepancy between the presumption of corruption and the existence of proven corruption.

Organizations such as Transparency International, which measure the Corruption Perception Index (CPI), report worsening levels for Bulgaria (Transparency International, 2025). Yet, despite these indicators, there remain few or no convicted individuals, and consequently, limited media commentary on accountability and enforcement.

In summary, while Bulgarian media succeed in reflecting major national risks, their coverage remains episodic and reactive, with insufficient analytical depth or focus on long-term structural solutions. Strengthening media independence, fostering public trust, and improving civic education are therefore key prerequisites for enhancing the media's capacity to function as a genuine guardian of democratic accountability.

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TRUST, FAKE NEWS, AND SOCIAL MEDIA: HOW BIASED REPORTING INFLUENCES MEDIA TRUST AMONG SERBIAN YOUTH

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Abstract: In today's media-saturated environment, trust in information sources is becoming increasingly fragile—especially among youth. In Serbia, the mainstream media landscape is often characterized by political bias, soft censorship, and declining journalistic independence, leading to widespread public skepticism. Meanwhile, social media has emerged as a popular but unregulated alternative, particularly among younger generations. This study investigates how biased reporting and the spread of fake news impact young people's trust in both traditional and digital media. Using a mixed-methods approach, including literature review and original survey data from Serbian university students (aged 18–25), the research reveals that trust in mainstream media is notably low. Many respondents rely on social media despite recognizing its limitations, creating a paradox of convenience and skepticism. The results show a trend of media disengagement and growing apathy, which pose serious risks for democratic participation. These findings emphasize the need for improved media literacy education and institutional support for independent journalism.

Keywords: *Media bias, fake news, youth trust, Serbia, social media, media literacy*

Field: Social Sciences

1. INTRODUCTION

In democratic societies, the presence of a free, independent, and trustworthy media landscape is widely recognized as a foundational pillar for enabling informed civic participation and sustaining democratic governance. This is especially critical among young citizens, who represent the future of democratic engagement and political involvement. However, in Serbia—a post-socialist democracy with a historically complex and often turbulent media environment—the questions surrounding media independence, transparency, and the extent of government influence remain persistent and deeply contested in both public and academic discourse. Over the past decade, Serbia has witnessed a notable decline in press freedom, characterized by a growing concentration of media ownership in the hands of a few, the prevalence of opaque and non-transparent funding mechanisms, and documented instances of direct and indirect government pressure on editorial content. These trends have been extensively documented by international watchdogs such as Freedom House (2023), which highlight the risks these factors pose to pluralism, impartiality, and the overall credibility of the media sector.

Within this challenging media landscape, young people aged 18 to 25 occupy a particularly vulnerable position. Despite being highly active users of digital media and social networking platforms, many young Serbians often lack the formal training or critical skills necessary for effective news literacy and discerning consumption of information. This paradox results in a demographic that is simultaneously digitally fluent yet susceptible to misinformation, manipulation, and media distortion. Surveys and studies, such as those conducted by Stanojević and Branković (2021), reveal that young people frequently express feelings of confusion, skepticism, and even disengagement when interacting with political news and media content, which can undermine their trust in news sources and dampen their motivation to engage in civic dialogue.

Compounding these challenges is the growing prominence of social media platforms such as Instagram, YouTube, and TikTok, which have emerged as preferred sources of news and information for Serbian youth. These platforms offer the advantages of immediacy, diverse formats, and content tailored to young users' preferences, making them attractive alternatives to traditional news outlets often perceived as biased or controlled by political interests. However, the structural dynamics of social media—where algorithms prioritize content that maximizes user engagement rather than accuracy—introduce new complexities. This dynamic often results in the rapid spread of unverified or false information, which further blurs the lines between legitimate journalism and misinformation. Consequently, young users face heightened challenges in distinguishing credible news from deceptive content, exacerbating the existing trust deficit.

Against this backdrop, the present study investigates the core research question: How does exposure to biased, unreliable, or manipulated news content impact media trust among Serbian youth?

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The study aims to provide a nuanced understanding not only of the behavioral patterns and preferences in media consumption but also of the broader psychological and civic consequences that arise from declining trust in news sources. Through this investigation, the research seeks to contribute to ongoing discussions about media literacy, democratic resilience, and the role of youth in shaping the future media landscape of Serbia.

2. MATERIALS AND METHODS

2.1 Research Design

This study adopted a mixed-methods research design, integrating both qualitative and quantitative approaches to provide a comprehensive understanding of media consumption habits and trust in news sources among university students in Serbia. The initial critical literature review informed the development of the survey instrument, ensuring that the items were theoretically grounded and reflective of current academic discourse on media trust, bias, and misinformation. This qualitative phase helped identify recurring themes and gaps in the existing research, which were then translated into measurable variables. The quantitative component, primarily derived from the structured online survey, enabled the collection of empirical data that could be analyzed for patterns and correlations. This triangulation of methods enhanced the validity and reliability of the study by cross-verifying findings from multiple sources and perspectives.

2.2 Survey Instrument

The primary data collection tool was a self-administered, 15-item questionnaire created in the Serbian language to ensure accessibility and cultural relevance for the target population. The survey was distributed using popular digital platforms frequented by university students, including Telegram groups, Instagram pages, and university-affiliated online forums. These channels were chosen to maximize outreach and engagement among digitally connected youth.

The questionnaire was structured to explore several key dimensions of media interaction:

- **Primary sources of news consumption**, such as television, online news portals, social media, or messaging apps;
- **Perceptions of bias** in both traditional and digital media landscapes;
- **Personal encounters with misinformation or fake news**, including the frequency and context of such experiences;
- **Levels of trust** in various media platforms, with an emphasis on distinguishing between institutional and user-generated content;
- **Fact-checking behaviors**, assessing how often respondents verify the accuracy of the information they consume and which tools or platforms they use for this purpose.

The survey comprised both closed-ended questions (e.g., Likert scales, multiple choice) to facilitate statistical analysis and open-ended prompts to elicit richer, more individualized responses. The estimated completion time was under 7 minutes, which was intended to reduce participant fatigue and increase response rates without compromising data quality.

2.3 Sample and Ethics

The final sample consisted of 102 valid responses, collected over a two-month period from August to September 2025. Participants were university students aged between 18 and 25, recruited from Serbia's major academic hubs—Belgrade, Novi Sad, Niš, and Kragujevac. This demographic was chosen due to its high level of digital literacy, frequent engagement with online media, and relevance to contemporary discussions about information consumption among youth.

Participants were not compensated and were informed of their rights before taking part. Participation was entirely voluntary, anonymous, and in compliance with ethical research guidelines. No personally identifying information was collected. The survey was hosted on a GDPR-compliant platform to ensure the protection of digital data, and informed consent was obtained at the beginning of the questionnaire. Ethical approval for the study was obtained from the relevant academic oversight body prior to data collection.

2.4 Limitations

While the study design offered a practical and scalable approach to understanding student media habits, certain limitations must be acknowledged. First, the use of an online survey as the sole data collection method may introduce a selection bias, skewing the sample toward more digitally engaged and urban populations, potentially underrepresenting students from rural areas or those with limited internet access.

Second, the self-reported nature of the data, particularly regarding perceptions of trust, media bias, and misinformation, carries an inherent degree of subjectivity. These attitudinal variables are influenced

by personal beliefs, experiences, and cognitive biases, and should not be interpreted as objective assessments. Nevertheless, such subjectivity is appropriate and expected in social research exploring perceptions and behaviors. Finally, while efforts were made to ensure diverse geographic representation within Serbia, the sample may not fully reflect the broader student population, limiting the generalization of findings beyond the specific context studied.

3. RESULTS

3.1 Media Consumption Habits

A significant majority (67%) of respondents reported that they consume news primarily through Instagram or YouTube, with platforms like TikTok growing in popularity for political content. Only 18% relied on traditional TV news such as RTS, Pink TV, or Prva, and just 9% expressed trust in these sources.

Additionally, 72% stated they actively follow independent media (e.g., N1, Nova S, or KRIK), yet even among these, skepticism remains. Most respondents described checking multiple sources before forming an opinion.

3.2 Perceived Media Bias

An overwhelming 81% of respondents identified traditional Serbian media as politically biased, citing pro-government favoritism, selective reporting, and lack of critical coverage. Interestingly, 52% considered social media “less biased,” but also “more chaotic.” Some described it as “the only place you see everything,” despite not trusting its content entirely.

3.3 Exposure to Fake News

89% of respondents said they had encountered fake news in the past months, or even years. Common topics included COVID-19, elections, EU integration, and conspiracy theories. Respondents shared instances such as a fabricated story about foreign “interference” in domestic protests.

Only 31% said they frequently fact-checked news before sharing. Reasons for not checking included time constraints, difficulty verifying, and trust in peers who shared the content.

Moreover, gender differences were observed in trust patterns. Female respondents reported slightly higher trust in international news outlets like BBC or Al Jazeera, while male respondents were more likely to follow political influencers on YouTube and TikTok. This divergence suggests that even within youth groups, media trust and exposure are shaped by identity, interests, and social networks. A small subgroup (6%) reported using VPNs or foreign IPs to access news sites blocked or throttled in Serbia, highlighting proactive strategies some young users employ to bypass media control.

3.4 Trust and Civic Impact

Only 14% expressed high trust in any media platform. The majority reported moderate or low trust, with many admitting they had “tuned out” from following the news entirely. One respondent noted: “I try to stay informed, but I don’t know who to believe anymore.”

A concerning 60% reported intentionally avoiding news during times of political tension. This avoidance may contribute to a broader trend of civic disengagement, especially in political participation and voting.

4. DISCUSSIONS

The findings confirm that Serbian youth operate in a highly skeptical media environment. Traditional media outlets are largely distrusted due to state influence and lack of transparency (Marković, 2020), while digital alternatives—though more accessible—fail to provide consistent, verified information.

This media distrust mirrors broader regional trends in Eastern and Southeastern Europe, where political polarization and digital disinformation have created fragmented public spheres (Ćirić, 2022). The Serbian case reflects a hybrid crisis: young people neither trust mainstream outlets nor fully believe what they find on social media.

Importantly, trust erosion does not appear to be a result of ignorance, but rather of overexposure and contradictory information. Youth are aware of manipulation and misinformation but often lack the tools—or energy—to evaluate every piece of content critically.

These results raise important implications for democratic health. Without trusted sources of news, young citizens may disengage from voting, activism, or critical debate. Scholars like Vraga and Tully (2021) have noted that low media trust can result in apathy, withdrawal, or susceptibility to echo chambers.

However, the results also offer opportunities. A minority of participants (12%) who had received formal media literacy training showed significantly higher confidence in identifying bias and misinformation. This supports previous findings that education is a protective factor against manipulation (Mitrović &

Savić, 2021).

These findings also reflect the psychological toll of navigating information in a polarized environment. Constant exposure to conflicting narratives leads to “news fatigue,” where individuals deliberately avoid media to protect their mental health. This is especially true for students balancing academic stress with political anxiety.

In addition, the role of digital algorithms cannot be overlooked. Many young Serbians receive news through curated content—often selected by opaque engagement-based recommendation systems. This creates “personalized echo chambers,” where individuals are repeatedly exposed to reinforcing viewpoints, further limiting their exposure to diverse perspectives (Kričković & Petrović, 2023).

Regional comparisons support these trends. Studies from Hungary and Bulgaria have shown similar media fatigue and distrust among youth living under semi-authoritarian or transitional media environments. Serbia’s case, therefore, may not be unique, but part of a wider pattern in post-socialist states where democratic backsliding correlates with declining media freedom and civic engagement.

Interestingly, participants also expressed nostalgia for what they called “objective journalism,” a concept they admitted they had never actually experienced firsthand. This imagined ideal speaks to a collective yearning for reliability and neutrality in public discourse—one that remains unfulfilled in both traditional and digital media spheres.

5. CONCLUSIONS

This study reveals a deeply troubling yet critically important insight into the media consumption landscape among Serbian youth: while young people are extensively immersed in various forms of media, they remain profoundly disconnected from the question of its trustworthiness. The widespread perception that traditional media outlets are heavily politicized, combined with the unpredictable and often chaotic nature of social media platforms, has created what can best be described as a pervasive “trust vacuum.” This vacuum is characterized by skepticism, uncertainty, and disengagement, which undermines young people’s ability to confidently navigate the complex information environment they inhabit.

In order to address this alarming phenomenon, two primary strategies must be prioritized and implemented effectively. First, there is an urgent need to expand media literacy education substantially, particularly at the high school and university levels. Such educational initiatives should aim to equip young people with the critical thinking skills and evaluative tools necessary to discern credible information from misinformation and bias. By fostering a generation of media-savvy citizens, these programs can empower youth to become more discerning consumers and creators of information, thereby strengthening the foundations of an informed public discourse.

Second, it is essential to provide robust institutional and financial support for independent journalism. Independent media outlets serve as vital counterweights to state-controlled or politically influenced information sources. Supporting these outlets is crucial to ensuring the availability of reliable, diverse, and unbiased news coverage, which in turn can help restore public confidence in the media. Without such support, the concentration of media ownership and editorial control risks perpetuating cycles of distrust and misinformation.

Looking ahead, future research should seek to determine whether these patterns of media distrust and disengagement are unique to Serbia or are part of broader trends across other Balkan countries and similar socio-political contexts. Additionally, empirical studies are needed to rigorously assess the effectiveness of media literacy interventions in shaping youth attitudes and behaviors. Such research could provide valuable evidence to guide policy development and educational programming aimed at rebuilding trust in media ecosystems.

Based on the findings presented here, several concrete policy recommendations emerge. First, partnerships between educational institutions and non-governmental organizations (NGOs) should be actively promoted to develop and implement accessible media literacy programs across secondary schools and universities. These programs should extend beyond simply teaching young people how to identify fake news; they should also include education about the structural biases embedded within media systems and foster emotional resilience against information overload and misinformation fatigue.

Second, social media platforms operating in Serbia must be held accountable to increase transparency regarding their algorithms and content moderation practices. Whether through regulatory measures or public pressure, these platforms should be encouraged—or required—to prioritize credible local journalism in their news feeds and limit the spread of sensationalized or false content. Furthermore, the establishment of independent watchdog organizations and the development of civic technology tools could provide ongoing monitoring and assessment of how information is disseminated online, thereby

promoting greater accountability and trustworthiness.

Finally, it is imperative that academic researchers and institutions continue to investigate youth attitudes toward media, framing the issue not only as a crisis of trust but also as an essential lens through which to understand the future trajectory of democracy in Serbia. Media trust encompasses far more than the accuracy of news—it touches on deeper questions of identity, agency, and belonging within the public sphere. When young people feel alienated from the media that shapes public dialogue, there is a significant risk that they may also become alienated from democratic participation and civic engagement itself. Addressing this challenge is therefore not only a cultural imperative but a fundamental necessity for sustaining and strengthening democratic governance.

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PSYCHOLOGICAL CAPITAL AS AN INTANGIBLE DRIVER OF ECONOMIC GROWTH

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Abstract: The new social and economic paradigm, organised around emerging information technologies, represents profound organizational, political, economic, social and cultural changes at various levels – from individual companies to entire countries, from specific regions to global transformation. Economic development under these conditions cannot be analyzed solely through tangible and measurable inputs such as labor, capital and technology. It is now essential to consider the impact of intangible resources, including human, intellectual, social, moral and psychological capital. Economic growth, educational attainment, business and entrepreneurship, social behavior and inequalities, as well as earnings, are economic aspects of psychological capital. These aspects are key indicators of its significance in both individual personal development and the economic development of society. Despite its well-documented influence on organizational outcomes, the macroeconomic implications of psychological capital remain largely unexplored. This paper addresses this gap by developing a conceptual model linking psychological capital with human capital, social capital, productivity, unemployment and economic growth. The impact of psychological capital on economic growth is demonstrated using the system dynamics method, employing qualitative cause-and-effect diagrams to highlight key variables and feedback mechanisms. The conclusion is that economies with higher levels of psychological capital demonstrate greater productivity, lower unemployment, increased human and social capital and consequently, higher economic growth. The research underscores the need for future empirical validation through system dynamics modelling and simulation.

Keywords: *psychological capital, human capital, economic growth, system dynamic.*

Field: Social sciences (economy)

1. INTRODUCTION

The subject of this paper is qualitative system dynamic modelling of the effects of psychological capital on economic growth. The increasing complexity of production systems and the shift towards knowledge and innovation-based economies underscore the growing importance of intangible assets (Corrado, Crouzet, & Jäger, 2022). In the context of technological disruption and global uncertainty, resources rooted in human psychology have gained renewed attention (Helliwell, Layard and Sachs, 2021). Among these, psychological capital comprising self-efficacy, optimism, hope and resilience has become a crucial determinant of individual and collective performance (Luthans, Youssef-Morgan, & Avolio, 2015).

The objective of this paper is to develop a conceptual model linking psychological capital to economic growth through its interactions with human capital, social capital, productivity, and employment. Using the system dynamics approach (Forrester, 1961), the model identifies key variables and feedback mechanisms that explain how psychological capital contributes to long-term economic development.

Traditional economic models emphasize tangible inputs, but such frameworks do not capture the qualitative aspects of productivity and human well-being essential for sustainable growth. The rise of information societies and digital transformation requires a broader conceptualization of capital, one that incorporates psychological resources into macroeconomic analysis (Bagna et al., 2024; Gumbau-Albert et al., 2022).

Numerous studies have shown that psychological capital positively influences employee motivation, innovation, and performance at the organizational level (Carter & Youssef-Morgan, 2022; Xu et al., 2022) but the macroeconomic implications of psychological capital remain largely unexplored (Tran et al., 2022). Understanding this relationship is critical for explaining how psychological resources, operating through human behavior and cognition, aggregate into national economic outcomes and resilience (Knapp & Wong, 2020). Recent contributions to the “mental wealth” paradigm (Tran, 2022; Bloom et al., 2024) highlight how collective psychological and social resources contribute to national prosperity. These frameworks argue that psychological wellbeing, trust and optimism should be treated as productive assets and as foundations of social cohesion and economic performance. Empirical growth models rarely incorporate such psychological constructs, leaving a significant theoretical and empirical gap between micro-level

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psychology and macro-level economics.

This paper addresses this gap by developing a conceptual model that links psychological capital to key macroeconomic outcomes: unemployment, productivity and economic growth, through its interaction with human and social capital. In doing so, it integrates perspectives from human capital theory (Becker, 1964), social capital theory (Putnam, 1993), and the resource-based view (RBV) (Barney, 1991), positioning psychological capital as an intangible yet strategic resource that enhances economic performance.

2. METHODOLOGY

In this paper, the system dynamics approach was used to develop a conceptual model of the influence of psychological capital on economic development. System dynamics is suitable for analysing complex, nonlinear systems, such as economic growth, characterised by interdependencies and feedback loops (Forrester, 1961). A causal loop diagram is a simple graphical representation that shows causal relationships between multiple variables, with arrows indicating the direction from cause to effect. It emphasises the feedback structure of a system and represents a qualitative model.

A structured literature review was also conducted to identify empirical and theoretical links between the key variables for the model: psychological capital, economic growth, human and social capital, unemployment and productivity. Human capital theory (Becker, 1964), social capital theory (Putnam, 1993) and psychological capital theory (Luthans et al., 2015) were integrated to frame the conceptual linkages. Psychological capital acts as an amplifier of both human and social capital by enhancing motivation, trust and adaptive behavior (Xu et al., 2022). The study aims to construct a system dynamic qualitative model, which could later be formalized using stock and flow diagrams and simulated with a quantitative system dynamics models.

3. LITERATURE REVIEW

The term psychological capital was defined by Goldsmith and colleagues as “those personality traits that contribute to an individual’s productivity, including personal perception, attitudes towards work, moral orientation, and general worldview.” The definition by researchers (Luthans et al., 2007.) is widely accepted in the literature, according to it, psychological capital is a positive psychological state in an individual’s development, characterised by:

- self-confidence – the willingness to invest the necessary effort to succeed in overcoming challenging tasks,
- optimism – creating a positive outlook about achieving success in the present and future,
- hope – perseverance towards goals and when necessary, the willingness to change the path towards achieving the goal,
- adaptability – surviving and maintaining balance when burdened by problems and adversity, in order to achieve success.

The theory of human capital (Becker, 1964) considers education, experience and skills as investments that increase the productivity and earnings of workers. Over the decades, the accumulation of human capital has been identified as a key determinant of economic growth (Romer, 1990; Lucas, 1988). However, to use human capital, the individual’s readiness, motivation, and ability are necessary, indicating that psychological capital is a prerequisite for the creation, accumulation and use of human capital. Psychological capital can be considered meta-capital, as it increases the efficiency of investment in human capital.

Empirical research (Sweetman & Luthans, 2010) shows that employees with higher psychological capital are more open to learning, more proactive in developing skills and more adaptable to technological changes (Zhao & Hou, 2021). Regions with higher levels of well-being, self-confidence and optimism demonstrate stronger innovation capacity and economic dynamism those facts show importance of psychological capital at societal level (Helliwell & Putnam, 2004; Tran, 2022).

Social capital theory emphasises networks, trust and norms that facilitate cooperation and collective action (Coleman, 1988; Putnam, 1993). High social capital improves the diffusion of information, reduces transactional costs, and encourages civic engagement, all this factors are strongly associated with economic development (Knack & Keefer, 1997). Social capital, characterised by trust, reciprocity and cooperation, depends on individual and collective psychological orientations, particularly optimism and resilience. Psychological capital forms the foundation of social capital. Optimistic individuals are more likely to invest in social relationships and maintain trust. In times of crisis and uncertainty, confident and resilient individuals help sustain social networks and promote civic engagement in problem-solving.

The results of an empirical study (Helliwell & Huang, 2010) indicate a positive feedback loop between psychological and social capital. Economies with strong social and psychological capital demonstrate higher institutional quality, greater diffusion of innovation, and increased resilience to crises.

The interaction between psychological and social capital can determine a society's ability to coordinate collective economic behaviour. In a society where trust prevails among individuals, as well as trust in institutions, there is a more optimistic outlook for the future, social transaction costs are reduced and productivity increases. Empirical studies (Chen et al., 2021) analysing the impact of team psychological capital on innovation performance has shown that psychological capital correlates with greater number of innovations.

Psychological capital affects both employment dynamics and productivity. Researchers (Larson and Luthans, 2006; Snyder et al., 2002) have found that individuals with high levels of hope and self-efficacy persist in job searches, achieve faster re-employment after dismissal and show greater adaptability in unstable labor markets, reducing unemployment costs and enabling more effective reintegration.

Psychological capital increases labour market flexibility, a key determinant of macroeconomic stability. Workers with higher psychological capital adapt to changes more readily and are more willing to undertake retraining. At the aggregate level, these micro-level behaviours lead to macro labour market outcomes.

Recent interdisciplinary research suggests broadening the definition of national wealth to include mental and social assets, introducing the concept of "mental wealth" (Tran, 2022; Bloom et al., 2024). This framework integrates mental health, well-being, and psychological resources as key determinants of sustainable prosperity.

Countries with higher levels of well-being and optimism tend to recover more quickly from crises, exhibit higher rates of entrepreneurship, and possess stronger innovation systems (Helliwell et al., 2021). Psychological capital therefore contributes to what may be termed economic resilience – the ability of an economy to maintain and restore productive activity aftershocks.

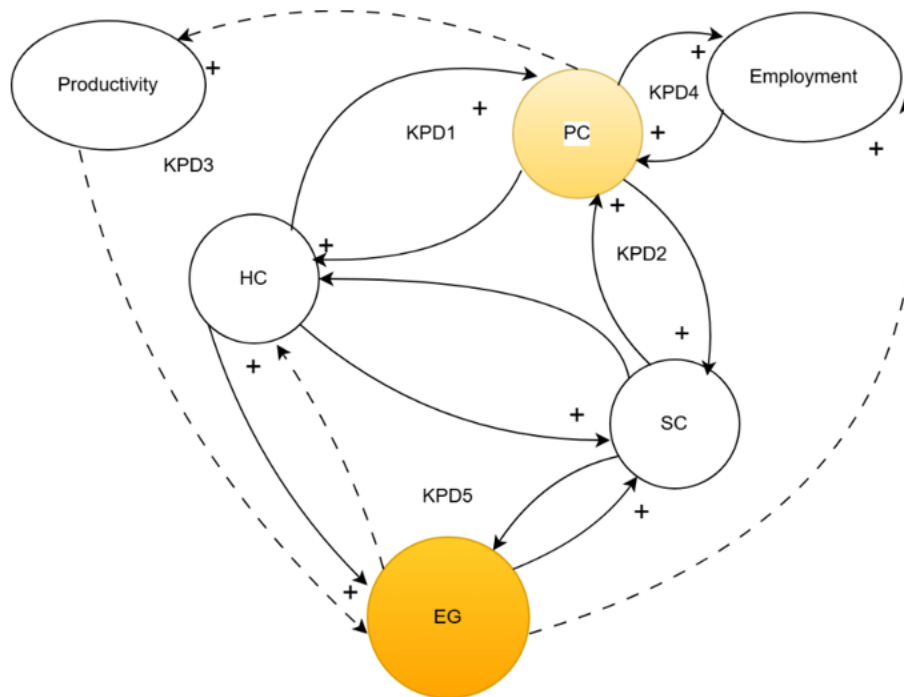
However, the empirical integration of psychological capital into macroeconomic models remains limited. Standard growth frameworks (Solow, 1956; Romer, 1990) include human capital and technological progress but omit motivational and affective factors. This study proposes that psychological capital serves as an intangible driver of growth, increasing the returns to human and social capital and strengthening adaptive capacities in complex economic systems.

4. RESULTS

Based on the analysis of parameters influencing psychological capital and interaction of social, psychological and human capital, its structural model is designed (Figure 1) The basic variables in this model are: productivity, employment, human capital (HC), social capital (SC), economic growth (EG) and psychological capital (PC).

Psychological capital plays an important role in increasing the efficiency of human capital, social capital and improving economic performance. The system dynamics model integrates both economic variables and the perceived psychological capital of the state. The economic variables are employment and productivity.

Figure 1. Psychological capital structural diagram



Source: Author's own

The structural diagram of psychological capital shows five feedback loops through which psychological capital influences economic growth.

Feedback loop KPD1 includes a link between the psychological capital and human capital. The link between psychological capital and social capital is described by feedback loop KPD2. Feedback loop KPD3 includes links between psychological capital, productivity, economic growth and human capital (PC – productivity – EG – HC – PC). Feedback loop KPD4 includes links between the psychological capital and employment. Feedback loop KPD5 comprises links between psychological capital, social capital, human capital, economic growth and employment (PC – SC – HC – EG – employment – PC). All included links in this five feedback loops are positive, meaning that loops have a global positive character. As the psychological capital increases, values of all include variables increase as well.

Higher psychological capital enhances motivation, adaptability and learning persistence, which strengthen human capital and, in turn, reinforce psychological capital through increased self-efficacy and competence (Xu et al., 2022).

Positive psychological states foster cooperation and civic trust, enhancing social capital and collective productivity (Putnam, 1993; Tran et al., 2022).

Individuals with higher psychological capital exhibit greater creativity and engagement, increasing organizational productivity (Carter & Youssef-Morgan, 2022; Luthans et al., 2015).

Thus, economies with higher average levels of psychological capital display greater adaptability, lower unemployment and higher long-term growth potential (Gumbau-Albert et al., 2022; Bagna et al., 2024).

All feedback loops in the system dynamics model are positive, meaning they have a reinforcing effect. Greater psychological capital increases productivity and employment, which in turn increases economic growth, resulting in further increases in psychological capital.

5. DISCUSSIONS

This conceptual framework expands traditional growth theory by introducing psychological capital as a fourth form of intangible capital, complementing human, social and intellectual capital (Corrado et al., 2022). It demonstrates that psychological capital not only contributes to firm-level performance but also exerts macroeconomic effects through productivity and labor market channels.

The theoretical implications of research lie in the fact that the inclusion of psychological capital in growth models enriches behavioral economics, integrating emotional and cognitive factors that influence

economic decision-making (Knapp & Wong, 2020). It also aligns with the “mental wealth” paradigm, which treats collective psychological assets as national productive resources (Tran et al., 2022).

Economic policy should extend beyond education and skills to include psychological resource development, such as training programs that cultivate optimism, resilience and self-efficacy (Carter & Youssef-Morgan, 2022). Empirical validation is the next step. Future research should operationalize national psychological capital indices and simulate the proposed system using real-world data. Despite being conceptual, this model lays the groundwork for empirical exploration of the psychological foundations of economic growth that is a domain largely overlooked in macroeconomic theory.

6. CONCLUSIONS

Psychological capital is a core intangible asset with significant implications for economic development. It serves as an intangible driver of growth, increasing the returns to human and social capital and strengthening adaptive capacities in economic systems.

This paper presents the complexity of the influence of psychological capital on the economic growth. The structural diagram of psychological capital provides a graphical representation of the interaction of individual factors under direct and indirect influence. This paper demonstrates that higher levels of psychological capital increase productivity, increase employment and enhanced human and social capital, resulting in stronger and more resilient economic growth.

The impact of social capital on economic growth is a topic that undoubtedly can and must be discussed further. The foundations of sustainable economic development are increasingly intangible resources, among which psychological capital plays an important role. Countries that invest in developing psychological capital through education, workplace culture and public policy will be better equipped to respond to the challenges of the global economy.

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THE NEW GLOBAL CONTEXT OF MIGRATION: DEMOGRAPHY OF THE FUTURE AND THE VISION OF FULL EMPLOYMENT

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Abstract: This study presents a detailed examination of contemporary migration trends in the Western Balkans, with particular focus on the Republic of Serbia and the Republic of North Macedonia. Its primary purpose is to analyze the demographic structure, age and gender distribution, and citizenship composition of migrants, while identifying the economic, social, institutional, and geographic factors influencing mobility in the region. The study aims to provide insights into the implications of labor migration for domestic labor markets, regional development, and the management of human capital. Employing a retrospective observational methodology, the research relies on official statistical data provided by national agencies, including the Statistical Office of the Republic of Serbia and the State Statistical Office of North Macedonia, covering the most recent years with available data. Descriptive statistical methods were applied to assess totals, age and gender distributions, and to compare trends between citizens returning from abroad and foreign nationals, with particular attention to working-age populations. The results reveal that young and middle-aged adults constitute the majority of migration flows in both countries, with male foreign immigrants predominating in Serbia, whereas returning citizens in North Macedonia show a more balanced gender distribution. Migration patterns are driven by limited professional opportunities, regional disparities, labor market segmentation, governance quality, social attitudes, and geographic factors, including rural depopulation and local economic structures. The study highlights the persistent risk of brain drain, particularly among skilled professionals, alongside potential benefits of human capital mobility, such as knowledge transfer and network development. Conclusions emphasize the need for holistic demographic and migration policies that integrate economic, social, and institutional considerations, ensuring both the quantity and quality of employment, promoting retention of skilled workers, and fostering equitable professional opportunities. Recommendations include the implementation of targeted strategies to mitigate adverse effects of emigration, enhancement of institutional and governance frameworks, and the strategic use of international mobility to support regional economic growth and social stability. Additional insights underline the importance of future research incorporating longitudinal and qualitative approaches to capture personal, cultural, and socio-economic motivations behind migration, which can inform evidence-based policy interventions and labor market planning. Overall, the study provides a solid foundation for proactive policymaking and long-term strategies designed to balance mobility with sustainable economic development and social cohesion across the Western Balkans.

Keywords: Human mobility patterns, labor mobility, demographic trends, brain drain, socioeconomic factors, Western Balkans.

Field: Social sciences

1. INTRODUCTION

Human migration has been a central aspect of societal development throughout history. The process began around 8000 BCE with the spread of agriculture from Southwest Asia into Europe, intensified during the Middle Ages along Eurasian trade routes such as the “Silk Road,” and expanded further following the discovery of the Americas in the 16th century (FAO-IPPC, 2016). In recent decades, international migration has accelerated, with the number of migrants rising from approximately 77 million in 1960 to around 244 million by 2015, increasingly concentrated in high-income countries (Batalova, 2023).

The Western Balkans countries have historically been significant source countries for labour emigration. Even during the Cold War, citizens of Yugoslavia enjoyed relative freedom of movement compared to other communist states, and labour emigration continued. The conflicts and ethnic tensions of the 1990s further reinforced migratory networks throughout Europe, creating enduring population shifts and shaping contemporary migration patterns (Kupiszewski, Kicinger, Kupiszewska, & Flinterman, 2009).

The Western Balkans countries have experienced significant emigration waves in recent decades. After World War II, three major waves shaped regional migration patterns. The first occurred in the early 1960s, driven by high unemployment in Yugoslavia and open migration policies in European countries. By the mid-1970s, around 1.1 million mostly young and low-skilled workers had left Yugoslavia, primarily moving to Germany, forming large diaspora communities. The second wave, during the 1990s, was largely forced, triggered by the violent dissolution of Yugoslavia, while the third ongoing wave, since 2010, has been motivated by economic and democratic challenges, the global financial crisis, and favorable EU

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migration policies, including visa liberalization. These combined emigration trends, along with low fertility rates, have contributed to population decline and aging in these countries. Since 1990, populations have dropped by approximately 9% in Serbia, 10% in North Macedonia, 24% in Bosnia and Herzegovina, and 37% in Albania. The number of emigrants has doubled over this period, reaching 4.6 million by 2019, representing up to 45% of the resident population in some of these countries (except Serbia, 14%) (Icoski, 2022).

Today, structural challenges in the region—such as labour shortages, declining rural populations, and limited professional opportunities for young adults—continue to drive emigration, particularly among skilled workers (Silovska Nikolova, 2023). National strategies have been implemented to retain talent; however, their practical impact remains limited, leaving many young professionals to seek opportunities abroad. Regional migration patterns indicate that the emigration of qualified young professionals is not limited to North Macedonia. Neighboring countries, including Albania, Bosnia and Herzegovina, and Serbia (Kosovo) have also experienced an increasing number of young professionals, particularly in the healthcare sector, seeking employment abroad. Limited opportunities for professional development in their home countries often drive these outflows, while the perceived higher salaries and living standards abroad further motivate migration, even though young professionals may not fully assess the actual benefits they will gain (Kacani, Trunk, Qorraj, & Shaqiri, 2025).

The question arises whether the accession of Western Balkan states to the European Union will trigger similar migration patterns as observed after the EU entry of Central European countries, when Bulgarians and Romanians moved westward in large numbers (Jashari & Elezi, 2014). Current examples, such as the high demand for skilled tourism workers in Croatia and the Adriatic coast of Montenegro, illustrate that labour mobility will likely continue to be a defining feature of the region. Employment policies, temporary contracts, and structural measures aimed at reducing unemployment among youth, women, and vulnerable groups are being implemented, yet their effectiveness remains uncertain (Jashari & Elezi, 2014).

Understanding historical and contemporary migration trends in the Western Balkans is therefore crucial for anticipating future labour market needs and designing policies that balance mobility, economic development, and social stability. This research provides a foundation for exploring the determinants of migration, the dynamics of labour mobility, and the implications of brain drain for regional development, particularly in the context of ongoing EU integration and post-communist economic transformation.

This research is organized as follows. Section 2 presents the materials and methods, describing the use of secondary statistical sources from Serbia and North Macedonia, the focus on working-age populations, and the descriptive analytical approach. Section 3 details the results, including demographic characteristics, age, sex, and citizenship of immigrants. Section 4 discusses the findings in relation to theoretical frameworks, socio-economic factors, and regional migration trends. Finally, Section 5 provides conclusions, policy implications, and recommendations for future research, emphasizing the interaction between labor mobility, economic development, and social stability in the Western Balkans.

2. MATERIALS AND METHODS

This study is based on secondary sources of information, including official statistical data from national institutions in Serbia and North Macedonia, covering the most recent years available. For Serbia, immigration data by age, sex, and municipality were obtained from the Statistical Office of the Republic of Serbia (2023). For North Macedonia, similar data including both citizens returning from abroad and foreign nationals were collected from the Migration Statistics publication by the State Statistical Office (2021).

The study focuses on immigrants aged 0–64, with particular attention to working-age groups (15–64). Data were categorized by age groups and sex, and totals were calculated for both citizens and foreigners. Comparative tables were constructed to facilitate the analysis of migration flows between the two countries.

Data analysis involved descriptive statistical methods, including totals, distributions by age and sex, and comparisons between citizens and foreign nationals. No experimental procedures were applied, and all data were publicly available. The study follows a retrospective observational approach, allowing for a clear presentation of recent immigration trends in the Western Balkans.

3. RESULTS

In 2023, the Republic of Serbia recorded a total of 19,181 foreign immigrants aged 15–34 (Statistical Office of the Republic of Serbia, 2023). The largest share of immigrants was in the 30–34 age group (7,592), followed closely by the 25–29 age group (7,057) and the 20–24 age group (3,384). The 15–19 age group accounted for the smallest share, with 1,148 immigrants. Across all age categories, males (14,134) outnumbered females (5,047), representing 62–66% of immigrants depending on the age group. This predominance of males indicates that labor-oriented migration continued to dominate in Serbia, particularly in sectors traditionally employing more men, such as construction and manufacturing. The highest numbers observed in the 30–34 age group suggest that recent migrants were primarily young adults in the early stages of their professional careers.

In 2018, the Republic of North Macedonia recorded a total of 2,455 immigrants, comprising 1,346 citizens returning from abroad and 1,109 foreign nationals. The largest shares of immigrants were in the 15–29 and 30–64 age groups. Among foreign immigrants, males outnumbered females, while the gender distribution among returning citizens was more balanced. In 2019, a total of 2,591 immigrants were recorded, including 1,417 citizens and 1,174 foreigners, showing a similar distribution by age and sex as in 2018. These figures suggest a trend of young professional migration from North Macedonia, whereas the relatively balanced gender composition among returning citizens may reflect additional motivations, such as family reunification or education-related returns.

Comparing the two countries, Serbia experienced substantially higher numbers of foreign immigrants than North Macedonia, highlighting differences in migration attractiveness and labor market opportunities. In both countries, the working-age population (15–64) constituted the vast majority of immigrants, emphasizing the economic drivers behind migration. The consistent age and gender patterns observed over multiple years indicate that migration flows in the Western Balkans were stable and largely predictable, providing useful insights for policymakers aiming to address labor market shortages and plan for social services.

The tables below present detailed data on immigrants by age, sex, and citizenship status for both Serbia and North Macedonia, highlighting key demographic characteristics and providing a basis for further discussion on regional labor mobility and brain drain phenomena.

Table 1: Immigration of foreigners in the Republic of Serbia by municipality, sex, and age groups in 2023

Republic of Serbia	2023			
	15-19	20-24	25-29	30-34
Age groups				
Total	1,148 (100%)	3,384 (100%)	7,057 (100%)	7,592 (100%)
Male	717 (62%)	2,238 (66%)	4,326 (61%)	4,853 (64%)
Female	431 (38%)	1,146 (34%)	2,731 (39%)	2,739 (36%)

Source: <https://data.stat.gov.rs/Home/Result/1811010103?languageCode=sr-Cyrl>

Table 2: Immigration to the Republic of North Macedonia by citizenship, sex, and age groups

Republic of North Macedonia	Group	Sex	Age 0–14	Age 15–29	Age 30–64
2018	Total	Women	87	568	635
		Men	76	632	814
	Citizens	Women	-	40	141
		Men	-	19	115
	Foreigners	Women	87	528	494
		Men	76	613	699
2019	Total	Women	64	678	578
		Men	64	796	877
	Citizens	Women	-	31	115
		Men	-	15	133
	Foreigners	Women	64	647	463
		Men	64	781	744

Source: https://www.stat.gov.mk/publikacii/2021/Gender%202021.WEB.pdf?utm_source.com

4. DISCUSSIONS

The analysis of immigration flows in Serbia and North Macedonia revealed distinct patterns in terms of age, gender, and citizenship status, highlighting the predominance of young and middle-aged adults among recent migrants. In Serbia, foreign immigrants were predominantly male, with males representing 61–66% across age groups. The largest shares of immigrants were observed in the 25–29 (37%) and 30–34 (40%) age groups, while the 15–19 age group accounted for only 6% of total immigrants, indicating that migration is concentrated among young adults in the early stages of their careers. In North Macedonia, the majority of foreign immigrants were also young and middle-aged, with notable differences between citizens returning from abroad and foreign nationals: returning citizens showed a more balanced gender distribution, whereas foreign nationals were predominantly male. The 15–29 age group constituted the largest proportion of migrants in both 2018 and 2019, representing roughly 45–50% of total immigrants, while older adults (30–64) made up around 35–40%. These patterns reflect the mobility of the working-age population in both countries and align with broader regional trends observed in the Western Balkans, where economic, professional, and social opportunities strongly influence migration decisions. Overall, the demographic composition of migrants suggests that labor mobility is concentrated among individuals in their most economically productive years, emphasizing the role of migration in shaping both domestic labor markets and broader societal structures.

The migration of young and middle-aged professionals can be seen not only as a response to market dynamics but also as a strategic mechanism for optimizing human capital and expanding employment opportunities. There exists a vast pool of underutilized social resources – technological, scientific, educational, organizational, cultural, and psychological – that, if mobilized effectively, could dramatically increase the availability of jobs. In a globalized labor market, conventional nation-centered approaches to employment are often insufficient; what is needed is a human-centered, worldwide perspective that recognizes the central role of employment in promoting economic well-being (Jacobs & Slaus, 2011). Furthermore, demographic trends in many developed regions indicate stagnation or decline of the working-age population, highlighting the increasing importance of mobilizing available talent – including through migration – to achieve full employment. In the Western Balkans, for instance, the substantial inflow of young immigrants to countries such as Serbia (aged 25–34) and the predominance of male migrants (61–66 %) illustrate how labor mobility can contribute to better utilization of human capital and help realize broader employment goals on both regional and global scales.

According to data from the National Employment Service, a total of 34,573 work permits were issued in 2022 to foreigners with temporary residence in Serbia. This figure represents a 5.5-fold increase compared to 2015, with a consistent annual growth rate of around 30%. In terms of educational attainment, most work permits were granted to individuals with levels III, IV, VII-1, and I of vocational qualifications. This indicates that migrants in Serbia are predominantly employed in the secondary sector, consistent with the segmented labor market theory. According to Nikolić (2023), the situation is expected to become

more challenging in the coming years, as unemployment is projected to approach the natural rate of unemployment—essentially, full employment—by the end of this decade. Such labor market conditions imply accelerated wage growth, potentially exceeding productivity growth, which could, in turn, slow down GDP expansion (Nikolić, 2023).

Conversely, the more balanced gender distribution among returning citizens in North Macedonia may reflect a wider variety of migration motivations, including family reunification, professional development, temporary labor mobility, and education-related travel. Such distinctions underscore the importance of considering both economic and social factors when analyzing migration flows in the region.

Economic, institutional, and governance factors appear to play a central role in shaping migration patterns. The neoclassical theory of migration emphasizes potential economic gains as the primary driver, while institutional theory highlights the influence of governance quality and institutional frameworks on individual migration decisions (Molnar, Ostojić, & Jovanović, 2024). Limited prospects for improving living standards, low wages, regional disparities, and perceived corruption act as additional push factors, encouraging migration even among highly skilled populations. The Western Balkans serve not only as countries of origin but also as a key transit region for migrants heading toward the European Union. Their geographic position between East and West, combined with visa-free regimes with the EU, has facilitated relatively rapid and low-cost migration flows (Zečević, 2022). During recent migration waves, the majority of migrants were young, many traveling with family, and originated primarily from conflict-affected countries such as Syria, Afghanistan, and Iraq. Push factors such as armed conflict, generalized insecurity, and limited access to basic services, along with pull factors like safety, employment opportunities, and better living standards in destination countries, continue to shape migration behavior. These dynamics illustrate that migration patterns in the Western Balkans are influenced not only by domestic socio-economic conditions but also by broader regional and international factors, including EU policies and geopolitical developments.

These observations are consistent with the migration hump hypothesis, which suggests that emigration initially rises with economic development, reflecting both structural labor market shifts and individual aspirations, before stabilizing as domestic opportunities expand and socio-economic conditions improve (Buettner & Muenz, 2020).

Cultural, social, and geographic dimensions further contextualize these trends. Media discourse often frames migration metaphorically, representing it as a “flooding crisis” or other natural disaster-related imagery, which can influence public perceptions and, indirectly, individual decision-making processes (Gorchev, 2022). In North Macedonia, the hilly and mountainous terrain shapes the rural economy and labor market, contributing to the emigration of skilled professionals seeking better career prospects abroad (Blazhevski, 2021), (Silovska Nikolova, 2023). Social attitudes, cultural frameworks, and regional identity, particularly within the South Slavic linguistic area, also inform how migration is perceived and experienced, affecting both the propensity to migrate and the reception of migrants within local communities (Muhić, Blaženović, & Hadžiahmetović Jurida, 2025).

Brain drain constitutes another critical aspect of migration in the region. While it may generate positive economic effects in certain contexts, such as the transfer of knowledge or capital accumulation, it can also lead to negative externalities, particularly in low-income regions where the outflow of skilled individuals limits domestic capacity and innovation (Mohamed, Amer, & Fattah, 2024), (Jovcheska, 2024). In North Macedonia, where approximately 20% of young people perceive corruption as a significant barrier to professional advancement, migration is often viewed as the most viable pathway to career development and economic stability (Blazhevski, 2021). The 2021 national census further highlighted the magnitude of this issue, showing that the country’s population had decreased by around 200,000 compared to the 2002 census, with migration, rather than natural demographic factors like declining birth rates, identified as the main driver of this decline (Samardžiev, 2022), (Taravari, Rexhepi, & Asani, 2025). These findings illustrate how structural, institutional, and demographic challenges intersect with individual aspirations to shape migration behavior and influence broader socio-economic trends.

Despite the insights provided, this study has certain limitations. The analysis relies primarily on official statistics, which may not fully capture informal or undocumented migration flows. Additionally, longitudinal and qualitative data on migrants’ decision-making processes were not available, restricting the ability to fully understand personal, cultural, and socio-economic motivations behind migration. Incorporating such data in future research could yield a more comprehensive understanding of migration dynamics, enabling more effective policy interventions and labor market planning.

Overall, the findings indicate that young and middle-aged adults constitute the core of migration flows in both Serbia and North Macedonia. Economic opportunities, institutional quality, labor market demands, social perceptions, geographic conditions, and educational factors collectively shape migration

patterns. These insights have significant implications for workforce planning, rural development strategies, and policy formulation aimed at mitigating negative effects of migration while leveraging the benefits of human capital mobility across the region. Understanding the interaction between economic, social, and institutional drivers of migration is essential for developing sustainable approaches that address both the challenges and opportunities presented by international mobility.

5. CONCLUSIONS

The present study provides a comprehensive analysis of recent migration trends in Serbia and North Macedonia, focusing on the demographic composition, gender distribution, and citizenship status of migrants. The findings indicate that young and middle-aged adults constitute the majority of migration flows in both countries, reflecting the mobility of the working-age population and the central role of economic and professional opportunities in shaping migration decisions. In Serbia, the predominance of male foreign migrants highlights the influence of labor market segmentation, whereas the more balanced gender distribution among returning citizens in North Macedonia suggests a broader spectrum of migration motivations, including family reunification, professional development, and education-related mobility.

Economic, institutional, and social factors collectively influence migration patterns. Limited prospects for improving living standards, low wages, regional disparities, and perceived corruption act as significant push factors, while institutional quality and governance frameworks affect the decision-making processes of potential migrants. Geographic and social conditions, including rural depopulation and the structural characteristics of labor markets, further shape migration dynamics, contributing to the emigration of skilled individuals from areas with limited economic opportunities. Additionally, media discourse and cultural frameworks influence public perceptions of migration, which may indirectly affect individual migration behavior.

The implications of these findings are complex. Policymakers must consider not only the quantity of employment opportunities but also the quality of work and the alignment of job structures with labor market needs. Efforts to mitigate the negative effects of migration, such as brain drain, should focus on creating sustainable professional opportunities, improving institutional and governance quality, and fostering conditions that encourage retention of skilled workers. At the same time, the potential benefits of human capital mobility, including knowledge transfer and the development of international networks, should be leveraged for regional development.

In conclusion, effective demographic and migration policy requires a holistic approach that integrates economic, social, and institutional dimensions. Sustainable strategies should aim to balance labor market expansion with decent working conditions, equitable access to professional opportunities, and the retention of human capital. By addressing these interconnected factors, Western Balkan countries can better manage migration dynamics, reduce negative externalities, and harness the potential of international mobility for economic and social development. Future research should continue to explore the interplay of these determinants, incorporating longitudinal and qualitative data to deepen understanding of migration behavior and inform evidence-based policy interventions.

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UNDERSTANDING THOMAS KUHN'S CONCEPTS AND IDEAS ON THE STRUCTURE OF SCIENTIFIC REVOLUTIONS

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Abstract: Throughout the course of human history, countless events have unfolded across distinct stages and temporal contexts, each leaving a discernible imprint on the trajectory of civilization's development. The emergence of science marked a profound transformation in modes of thought, wherein rationality became the principal foundation of reasoning. As Aristotle notes, Thales, Anaximander, and Anaximenes - Ionian philosophers of the sixth century BCE - were the first to inquire systematically into natural phenomena. These early stages of inquiry represent the formative phases of scientific investigation, during which science evolved through the formulation of increasingly sophisticated methods aimed at uncovering truth - if such a notion can be said to exist - or, more precisely, at establishing irrefutable facts. In his landmark work, *The Structure of Scientific Revolutions* (1962), Kuhn introduced a transformative framework for the philosophy of science. His shift from physics to the historical study of science was motivated by an interest in the quotidian practices of scientists and the mechanisms through which scientific knowledge evolves over time. *The Structure of Scientific Revolutions* was recognized by the Times Literary Supplement as one of the twenty most influential books published in the latter half of the twentieth century. The work generated widespread debate, as its central ideas resonated across disciplines - engaging natural and social scientists alike, as well as scholars within the humanities.

Keywords: *scientific revolution, paradigm shifts, knowledge, development.*

Field: Social Sciences

1. INTRODUCTION

Thomas Kuhn began his academic career as a physicist before transitioning to the history and philosophy of science. According to Kuhn (1962), scientific development occurs in two alternating phases: normal science and extraordinary or revolutionary science. Traditionally, scientific progress has been viewed as a continuous, cumulative process, advancing steadily from one stage to the next. Kuhn, however, challenged this linear perspective, arguing that scientific development cannot be understood solely as a progressive accumulation of knowledge. Instead, it fundamentally depends on shifts in scientific paradigms and generational differences in scientific understanding. Kuhn introduced key concepts that reshaped the philosophy of science, including: pre-science, normal science, paradigm shifts and scientific revolutions. These concepts not only enriched the discourse on science but also provided a framework for understanding how scientific knowledge evolves over time (Bird, 2017). On his article Normal science: not uncritical or dogmatic, Samuel Schindler explains normal science in a nutshell based on Thomas Kuhn's conceptions. Thus, Schindler explains the division of science into two periods, those being: normal and revolutionary. He writes: 'Periods of normal science are characterized by the scientific community adhering to a paradigm, which encompasses a governing theory (such as Newtonian mechanics) metaphysical views (such as action-at-a-distance), certain types of experimental practices, instruments, skills and 'exemplars', i.e., examples of good scientific practice. In scientific revolutions, paradigms are replaced by new, radically different, paradigms.' (Schindler, 2024).

2. MATERIALS AND METHOD

This paper adopts a conceptual and historical-analytical approach, grounded in Kuhn's (1962) theory of scientific paradigms and interpreted through Bird (2017). It examines the evolution of scientific disciplines by analyzing the phases of pre-science, normal science, crisis, and scientific revolution, emphasizing how paradigms shape legitimate problems, methods, and theoretical development. The study further applies this framework to the social sciences, particularly sociology, to explore the emergence, competition, and transformation of disciplinary paradigms.

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3. RESULTS

3.1. Unpacking Scientific Progress: Kuhn's Vision of How Knowledge Evolves

Bird (2017) distinguishes between the philosophy of science before and after Kuhn. Pre-Kuhnian thought, termed old rationalism, focused on how scientists should infer conclusions from evidence and choose between competing hypotheses. In contrast, the new paradigm represents Kuhn's revolutionary perspective, emphasizing the historical and sociological dimensions of scientific practice. Old rationalists generally assumed a cumulative, linear model of scientific progress, wherein knowledge builds incrementally and uniformly. Kuhn (1962) rejected this notion, arguing that scientific development proceeds through distinct phases influenced by scientific paradigms, disciplinary conventions, and generational factors. 'Until Kuhn emerged with *The Structure of Scientific Revolutions*, science scholars impression that the history of science was linear, i.e. not circular. Then, he came up with a work in which he claimed that the development of scientific discovery is cyclical (circular by revolutions that indicate significant changes in the comprehension of science.' (Ochichi, 2023)

Before a scientific discipline establishes a coherent paradigm, it exists in a state of pre-science. In this phase, scientific methods, theories, and standards are largely unstructured. Pre-science does not indicate the absence of knowledge but rather a lack of a unified framework, leaving room for methodological experimentation and theoretical development (Kuhn, 1962). Whereas, once a paradigm is established, science enters a phase Kuhn calls normal science. In this phase, scientific activity is guided by the paradigm, which defines legitimate problems and acceptable methods of inquiry. Kuhn (1962) describes this process as "puzzle-solving," where scientists work to refine and extend the paradigm. Normal science can be categorized into three primary activities: identification of significant facts, matching facts to theoretical expectations and articulation and refinement of theories. However, anomalies may emerge -phenomena that the current paradigm cannot explain. When such anomalies persist and the paradigm proves inadequate, science enters a crisis, which can ultimately lead to a scientific revolution (Kuhn, 1962).

A scientific crisis signals the inability of an existing paradigm to resolve recurring problems. In such cases, a new paradigm emerges to replace the old one, a process Kuhn (1962) identifies as a scientific revolution. Unlike political revolutions, Kuhn's concept is intellectual and methodological. It represents a fundamental transformation in how science is practiced and understood. Importantly, Kuhn argued that abandoning an old paradigm is not a purely rational process; rather, it occurs through the demonstration of successful practice within the new paradigm and the gradual conversion of the scientific community (Kuhn, 1962).

Alexander Krauss on his article *Debunking revolutionary paradigm shifts: evidence of cumulative scientific progress across science*, writes about dominant approaches of science evolution. Krauss notes that Thomas Kuhn offered the most influential model where by applying case studies, theories in a scientific field may go through fundamental changes over time (Krauss, 2024). Anna Martin-Michalska highlights the narratives that blame Kuhn for shattering the vision of science by his revolutionary mode: 'According to his historical findings, scientific theories do not tend to simply crumble under the weight of counterevidence. For it is only a provision of an alternative conceptualization that can cause a theory to be dropped.' (Michalska, 2023)

Kuhn's ideas extended beyond natural sciences, profoundly influencing sociology and other social sciences. Sociologists, concerned with the disciplinary status of sociology, embraced Kuhn's paradigm concept. Ritzer (2000), applying Kuhn's framework, argued that sociology operates as a science of paradigms, identifying three major competing frameworks:

1. **Social Facts Paradigm** – emphasizes abstract theories, such as functionalism and conflict theory, employing empirical and statistical methods.

2. **Social Action Paradigm** – focuses on social phenomena through observation, rejecting abstract theorizing; examples include symbolic interactionism and phenomenological sociology.

3. **Social Behavior Paradigm** – combines abstract theory with behavioral and exchange theories, often using experimental methods aimed at social improvement.

Kuhn's philosophy also contributed to the sociology of science by incorporating external social factors into the understanding of scientific practice, contrasting with Merton's focus on internal scientific norms (Baber, 2017). Kuhn's work established a foundation for a sociology of science that integrates epistemic justification with social context, demonstrating how scientific knowledge becomes accepted within a community.

4. DISCUSSIONS

4.1. Debating Kuhn's Theory of Scientific Change

Despite its influence, Kuhn's framework has faced considerable criticism regarding its account of scientific progress. Scholars have highlighted historical revisionism, pointing to selective interpretations of past scientific events (Hekint, 2017), as well as the influence of non-scientific biases, where sociological or cultural factors shape what counts as "normal science" (Hekint, 2017). Critics also note exceptions to paradigm-based progress, citing cases of advancement that cannot be explained solely by paradigm shifts (Hekint, 2017).

Conceptually, Kuhn's notions of paradigms and revolutions have been challenged for their ambiguity and inconsistent application, while historical evidence suggests that smaller paradigms can supplant larger ones, blurring the distinction between normal and revolutionary science (Hekint, 2017). His stance on theory choice has also been critiqued for undermining rational decision-making, contrasting with modern expectations of reasoned inference (Hekint, 2017). Furthermore, Kuhn's sociological thesis, grounded in an idealist perspective, implies that thought shapes reality, a position at odds with the scientific aim of describing an observer-independent world (Hekint, 2017).

Galina Weinstein on her article *Einstein, Evolution of Knowledge, and the Anthropocene: A critical reading of Jurgen Renn's Historiography*, writes on the furthermore critiques like those of Renn's concerning Thomas Kuhn's core concepts. She writes: 'Renn problematizes its core assumptions. He challenges Kuhn's conception of scientific revolutions as abrupt, Gestalt-like transformations and instead frames conceptual change as a gradual, structurally embedded process. In this light, revolutions are extended reconfigurations rather than dramatic breaks.' (Weinstein, 2025). According to Schindler, Popper and Watkins also criticized Kuhn's work on *Scientific Revolution* being dogmatic and a danger to the science itself. 'Popper denied that this kind of work was in any way 'normal' in science and that if it were it would be a 'danger to science and, indeedm to our civilization. Watkins - who alongside Popper in the same volume criticized Kuhn's concept of normal science - also picks up on the dogmatism theme and concludes that 'Kuhn sees the scientific community on the analogy of a religios community and sees science as the scientist's religion.' (Schindler, 2024)

The process of paradigm shifts presents additional difficulties: establishing a new paradigm demands extensive empirical validation, and the entrenched dominance of existing paradigms often obstructs the adoption of new frameworks (Hekint, 2017). These critiques underscore the ongoing debates surrounding Kuhn's theory, highlighting both its enduring impact and its limitations in explaining the complexities of scientific progress.

As Craig A. Layman and Andrew L. Rypel write on their paper *Beyond Kuhnian paradigms: Normal science and the theory dependence in ecology*: 'Kuhnian normal science is neither intended nor expected to produce novel discoveries or significant alternations to an existing paradigm. Scientists are expected to expand and contextualize existing scientific theories, not disprove them. Anomalous findings may discredit the scientist, not the accepted theory. Kuhn likened normal science to puzzle-solving-successful scientists are those who are successful puzzle solvers. It is known a priori that puzzles have solutions, so scientists are not bound by the fear they may be working on an impossible problem.' (Layman, Rypel, 2023)

In synthesizing these diverse interpretations and critiques of Kuhn's framework, it becomes evident that the historiography of science remains a contested terrain shaped by competing epistemological commitments. Scholars such as Renn and Weinstein encourage a reconceptualization of Kuhn's abrupt "revolutions" into a more evolutionary, cumulative model of conceptual change, one that accounts for the structural and cognitive continuities underlying scientific progress. This shift from rupture to reconfiguration does not merely reinterpret Kuhn's legacy; it reflects broader transformations in how contemporary historians and philosophers of science understand knowledge production within complex socio-material systems.

At the same time, critics like Popper and Watkins remind us that the dialogic tension between normal and revolutionary science cannot be dismissed as a mere semantic dispute. Their concerns about dogmatism, conformity, and the quasi-religious aspects of scientific paradigms point to enduring questions about the autonomy of reason and the dynamics of consensus in scientific communities. Krauss's and Michalska's analyses reinforce this point by illustrating that, even when revolutions occur, they do so against a backdrop of cumulative refinement and sustained problem-solving - suggesting that radical change and incremental progress may not be as mutually exclusive as Kuhn's original formulation implied.

5. CONCLUSIONS

Kuhn's inquiry into the structure of scientific revolutions reflects philosophical questioning similar to that of traditional philosophers, yet applied to the scientific corpus. In *The Structure of Scientific Revolutions* (1962), Kuhn emphasizes the fallibility and revisability of scientific knowledge, rejecting the notion of immutable truths. He advocates for the reassessment, reconstruction, and reevaluation of theories, paradigms, and research methods, acknowledging that their efficacy may vary according to historical and temporal contexts.

Kuhn promotes the development of entirely new theories and the replacement of existing paradigms, contributing to science in a revolutionary sense. By challenging rigid frameworks and supporting methodological innovation, Kuhn demonstrates that scientific progress is not strictly linear and allows for the creation of entirely new conceptual structures (Kuhn, 1962). His perspective also fosters a more liberal approach to social sciences, including sociology and psychoanalysis, by highlighting the influence of external factors on scientific practice (Bird, 2017; Ritzer, 2000). Kuhn's framework thus provides a conceptual lens for interpreting scientific achievements, positioning much of the history and philosophy of science as "normal science" within a new paradigm.

Ultimately, the evolution of the debate surrounding Kuhn's *Structure* reveals less about the obsolescence of his ideas than about their generative capacity to inspire reinterpretation. The enduring scholarly engagement - from Renn's structural embeddedness to Schindler's reappraisal of normal science - demonstrates the vitality of Kuhn's conceptual vocabulary in framing how we think about knowledge, progress, and transformation. As science itself continues to evolve in response to global challenges, so too must our historiographical models evolve - moving beyond rigid dichotomies of revolution and normality toward a more integrated understanding of the dynamics that drive scientific change.

In light of recent scholarship, the narrative of scientific development as purely revolutionary warrants reconsideration. As Krauss (2024) argues, empirical evidence across disciplines increasingly points to cumulative progress rather than radical paradigm shifts. Yet, dismissing Kuhn's model entirely would overlook its enduring theoretical power. As Martin-Michalska (2023) notes, Kuhn revealed that scientific theories do not collapse merely under counterevidence but through the emergence of superior conceptual alternatives. This insight remains vital for understanding the social and epistemic mechanisms of scientific change. Thus, rather than positioning cumulative and revolutionary models as oppositional, it may be more productive to view them as complementary dimensions of how science evolves - through gradual refinement punctuated by moments of conceptual transformation.

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CAN CONTEMPORARY STRATEGIES CREATE MULTIPLE IMPACT? REDEFINING EMPLOYER BRANDING THROUGH SUSTAINABILITY AND STAKEHOLDER ENGAGEMENT

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Abstract: This paper explores how contemporary corporate strategies can create synergy and generate multidimensional impact by integrating employer branding, sustainability, and stakeholder engagement within a unified organizational and communication framework. It analyzes a qualitative case from the pharmaceutical industry—an experiential sustainability initiative known as STADA EXPO—designed to connect employees and external stakeholders through immersive, value-driven experiences. The study investigates whether sustainability communication, when co-created with employees, can simultaneously strengthen internal engagement, enhance external reputation, and raise public awareness of corporate responsibility. A qualitative case-study approach combines document analysis, company publications, and secondary literature on employer branding and stakeholder management. The results indicate that experiential sustainability projects can transform corporate communication into multidimensional platforms that build emotional connection, reinforce authenticity, and foster collaboration across functions and geographies. By engaging employees as ambassadors and hosts, organizations translate abstract environmental, social, and governance (ESG) commitments into tangible human experiences that inspire both the current and future workforce as well as the wider community. The paper concludes that employer branding must evolve beyond image management toward purpose-driven engagement as a strategic enabler of resilience and shared value, emphasizing the integration of sustainability storytelling and employee participation into HR and communication strategies to achieve measurable, long-term impact across social, cultural, and business dimensions.

Keywords: employer branding, sustainability, stakeholder engagement, corporate culture, employee experience, shared value.

Field: Social sciences

1. INTRODUCTION

In an increasingly competitive labor market, an organization's reputation has become one of the most decisive factors in attracting high-quality candidates. In this context, the significance of employer branding can hardly be overstated. According to a recent report by Apollo Technical (2025), as many as 75 percent of job seekers research an employer's reputation and brand before applying for a position. This shift confirms that employer branding has evolved from a peripheral marketing tool into a strategic determinant of organizational attractiveness and long-term competitiveness (Reis, Sousa, & Dionísio, 2021; Backhaus & Tikoo, 2004).

Within the broader sustainability discourse, contemporary scholarship highlights the growing importance of Green Human Resource Management (Green HRM)—the systematic inclusion of environmental and social goals across HR practices, from recruitment and training to performance appraisal and employee engagement. As Chowdhury, Mendy, and Rahman (2023) observe, Green HRM models increasingly underpin sustainable organizational identities and provide frameworks for redefining success through ecological and social contribution. In parallel, Mazur (2025) introduces the concept of employee-driven branding for sustainability, emphasizing that employees themselves are becoming brand co-creators who project organizational values and purpose both internally and externally.

Against this backdrop, the present study explores how purpose-driven innovation can redefine employer branding and foster cross-sector collaboration by aligning human capital management with environmental, social, and governance (ESG) principles (Deloitte, 2023, 2024). Drawing upon the case of STADA EXPO, an experiential sustainability platform developed by the STADA Group and its Serbian affiliate Hemofarm, the paper examines how immersive, employee-centric communication initiatives can generate multiple impact—simultaneously strengthening talent attraction, internal engagement, stakeholder trust, and the organization's broader social legitimacy (Rašković, 2023; Stada, 2023).

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2. MATERIALS AND METHODS

The study adopts a qualitative case-study design, suitable for examining complex organizational phenomena within their real-life context. The selected case—STADA EXPO—represents an innovative corporate initiative combining experiential learning, multimedia digital communication, and sustainability education (Hemofarm, 2024; NIN Business Club, 2024). The initiative was developed and implemented by the STADA Group, with its Serbian affiliate Hemofarm, and designed as a mobile, interactive exhibition constructed entirely from recycled and repurposed shipping containers. These four interconnected containers form a dynamic, walk-through narrative about the company's heritage, values, and commitment to sustainable development (Rašković, 2023).

Each section of the EXPO presented a different thematic dimension through digital, sensory, and participatory storytelling. The first container introduced visitors to the history and evolution of STADA through a large-format immersive film projection, tracing its milestones and contributions to public health and community well-being. The second container focused on the company's global production network, displayed via an illuminated world map visualizing the locations of STADA's manufacturing sites.

A subsequent interactive zone employed a holographic representation of the human body, allowing visitors to explore the relationship between pharmaceutical research and various aspects of human health—without referring to or promoting specific branded medication, in compliance with legal standards regulating pharmaceutical communication.

The following segment illustrated corporate culture and values through employee testimonials projected on digital walls, demonstrating how STADA's purpose is translated into everyday work practices. A virtual production tour, experienced through VR headsets, further showcased the company's production processes and its commitment to precision, quality, and technological innovation. Finally, an ESG zone invited visitors to interact with touch-sensitive panels to explore how small, everyday actions—such as reducing waste or conserving water—can collectively contribute to a more sustainable future (Stada, 2023).

Data sources included company publications, sustainability reports, and media materials, as well as scholarly literature on employer branding, CSR, and stakeholder engagement (Reis et al., 2021; Porter & Kramer, 2011). A thematic content analysis was applied to identify patterns related to employee engagement, stakeholder interaction, and brand authenticity within the experiential framework of the project.

3. RESULTS

Within its first twelve months of operation in 2023, the EXPO achieved significant outreach and engagement: a 12-month European tour, four interconnected recycled containers equipped with 4.5 tons of multimedia technology, seven cities in four countries (Serbia, Romania, Montenegro, and Bosnia and Herzegovina), over 11,000 visitors, and more than 300 media publications (Hemofarm, 2024; Stada, 2023). The initiative later expanded with visits to the United Kingdom (Clarke, 2024) and Germany, where it was ceremonially opened in Bad Vilbel (STADA Arzneimittel AG, 2024).

Beyond visibility, tangible employer-branding outcomes were recorded. Internal HR analytics indicated an increase of over 10 percent in received CVs at locations where the EXPO was hosted, compared with previous recruitment cycles. Although detailed HR data remain confidential and cannot be publicly disclosed, this correlation suggests that experiential sustainability communication can positively influence both the perception of the employer brand and the organization's talent pipeline. These findings support previous research identifying employer branding as a strategic tool for talent attraction and retention within competitive labor markets (Reis et al., 2021) and align with corporate insights highlighting the link between ESG engagement and employer appeal (Deloitte, 2024). Moreover, recent analyses indicate that well-designed sustainability communication enhances corporate credibility and stakeholder perception, which in turn strengthens employer attractiveness, candidate engagement, and long-term talent retention (Borges et al., 2023; Mazur, 2025).

The exhibition's design encouraged learning through experience rather than passive observation. Visitors progressed through interactive zones combining film projections with new digital technologies such as holographic visualizations, virtual-reality equipment, and touch-sensitive panels that illustrated sustainability principles and everyday contributions to environmental care. This digital and multisensory setup enabled visitors to grasp complex topics—such as the relationship between science, community, and health—through accessible, emotion-based engagement (Weder & Stranzl, 2025).

A defining feature of STADA EXPO, as a technology-driven and experience-centered event, was

the inclusion of employee hosts—volunteers from various departments and sites—who served as guides and storytellers throughout the exhibition. Their participation added a strong human dimension to the experience, reinforcing authenticity and emotional resonance. Visitors frequently remarked that the stories felt personal and genuine, particularly when they recognized their hosts in the video testimonials displayed within the exhibition. This recognition consistently elicited positive emotional responses and strengthened the perceived credibility of the experience.

In addition, the modular design of the EXPO allowed for relocation and adaptation across multiple contexts, including internal employee events, local community gatherings, and university environments where talent sourcing or stakeholder engagement was strategically significant. This versatility confirmed its value as a contemporary engagement tool, bridging corporate communication and community outreach (Fobbe, 2024; Mazur, 2025).

4. DISCUSSION

The findings affirm that contemporary corporate initiatives such as STADA EXPO can produce multiple impact—enhancing organizational culture, brand reputation, and social value—when sustainability, employee engagement, and stakeholder collaboration are meaningfully integrated. The case exemplifies the transformation of employer branding from a marketing instrument to a holistic process of shared meaning creation, consistent with the inside-out model of brand building (Backhaus & Tikoo, 2004; Barrow & Mosley, 2011).

Through the creative use of new technologies—such as virtual reality headsets, holographic projections, and interactive touch-based installations—the EXPO generated a powerful multisensory experience. This technological layer did not serve as mere visual enhancement but created a synergy between learning, emotional engagement, employer branding, and ESG communication, reinforcing the overall impact of the initiative.

By empowering employees to act as narrative agents, STADA EXPO transformed internal engagement into a visible expression of organizational culture and purpose. Instead of relying on externally crafted messages, the initiative enabled employees to communicate sustainability values through authentic interaction — a practice that strengthens the perception of brand trustworthiness and integrity (Mazur, 2025; Fobbe, 2024). This model reflects the evolution of experiential employer branding, where credibility arises from shared experience rather than top-down messaging (Reis et al., 2021; Borges et al., 2023).

5. CONCLUSIONS

This study concludes that integrating sustainability, employee participation, and stakeholder collaboration creates multidimensional values: economic, social, and reputational. The STADA EXPO project demonstrates that corporate responsibility can evolve beyond compliance and philanthropy into a platform for innovation, learning, and organizational identity development. By aligning HR, CSR, and communication functions, companies are able to internalize sustainability as daily practice and reinforce employees' sense of belonging, pride, and purpose (Mazur, 2025).

Sustainability communication should therefore progress from the transmission of information to the creation of experiences that actively engage employees as storytellers and co-creators of authentic narratives. This participatory approach transforms organizations into agents of shared value and cultural resilience, capable of fostering trust, inclusion, and a deeper sense of collective responsibility across all stakeholder groups. In this way, sustainability becomes not only an ethical imperative but also a communicative and cultural process that binds people to shared purpose.

At a theoretical level, this research contributes to the growing body of literature linking experiential sustainability communication with employer branding and stakeholder engagement (Reis et al., 2021; Fobbe, 2024). It advances existing models by illustrating how employee-driven initiatives operationalize the idea of creating shared value (Porter & Kramer, 2011) and demonstrates that authenticity, rather than image management, represents the core of a sustainable corporate reputation (Borges et al., 2023; Weder & Stranzl, 2025).

At the same time, the findings carry important practical implications for organizations seeking to integrate ESG, talent engagement, and creative communication into a unified strategic framework. The STADA EXPO case illustrates that experiential initiatives—when designed as mobile, inclusive, and emotionally resonant formats—can strengthen recruitment outcomes, enhance employee pride, and build long-term stakeholder trust. By moving sustainability narratives closer to communities, campuses, and production sites, companies can expand their social footprint and reinforce their legitimacy in an

increasingly purpose-driven economy.

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THE ROLE OF THE LATIN LANGUAGE IN THE DEVELOPMENT AND STANDARDIZATION OF ANATOMICAL NOMENCLATURE

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Abstract: Latin has played a fundamental role in the creation, consolidation, and continuous development of anatomical nomenclature from the Renaissance to the present day. The aim of this article is to examine the linguistic and conceptual development of anatomical terminology and to explore the lasting influence of Latin on the standardization of anatomical nomenclature. The study uses a historical-linguistic and descriptive method, analyzing key moments from the early Greek names of body parts to the contemporary Terminologia Anatomica (TA2023AG). The results show that the adoption of Latin as the lingua franca of anatomy has provided a basis for semantic precision, morphological consistency, and cross-cultural scientific communication. Furthermore, the systematic revisions from Basle Nomina Anatomica (1895) through Nomina Anatomica (1955) to Terminologia Anatomica (1998, 2023) illustrate the dynamic interaction between linguistic tradition and scientific innovation. The discussion highlights the importance of Latin in contemporary medical education and international standardization, emphasizing its irreplaceable function as a unifying linguistic code in the biomedical sciences. In conclusion, the thesis on the need to preserve Latin as a reference framework in anatomical terminology is presented, along with the integration of modern bilingual structures that reflect current linguistic and didactic realities, as well as the need for its presence in the curricula of medical specialties. The importance of Latin is emphasized not as an anachronism, but as one of the most reliable and appropriate tools for scientific clarity, standardization, and universalism.

Keywords: Latin language, anatomical nomenclature, terminology, standardization.

Field: Humanities

1. INTRODUCTION

Scientific nomenclature (from Latin *nomenclatura* - "list of names") is a set of names used in every branch of science to designate objects of study (Vocabulary.com, n.d.), and its compilation is one of the most significant achievements of modern scientific thought. Specialized nomenclature aims to ensure clear and accurate communication in a given scientific field, which is why it has several important characteristics: unambiguity, precision, international uniformity, and stability. Anatomical nomenclature is also a component of scientific nomenclature. About 5,000 years ago in Ancient Greece, the first definitions of parts of the human body were given. They were spontaneous and depended on the observations and imagination of the author. During this period, there were about seven hundred anatomical names.

In the 15th century, Leonardo da Vinci brought order to anatomical nomenclature, becoming the first to categorize the muscles of the human body according to their function. After da Vinci's death, Andreas Vesalius continued to contribute to the development and systematization of nomenclature by removing Arabic definitions and translating all foreign words into classical Latin in his treatise *De humani corporis fabrica* (1543) (Kemp, 2017). In doing so, he attempted to achieve accuracy, etymological logic, and didactic clarity.

By the end of the 18th century, the number of anatomical names exceeded 30,000 and they needed to be selected and scientifically systematized. Henle (F. G. J. Henle) made a significant contribution to the development of anatomical terminology. Together with Owen (R. Owen), he proposed a number of terms denoting the planes and axes of the human body (*ventralis* - abdominal; *dorsalis* - spinal; *medialis* - directed inward, toward the midline; *lateralis* - directed outward from it), which greatly facilitates and simplifies the presentation of anatomy. Henle published the first descriptions of the structure and distribution of human epithelial tissue and the fine structures of the eye and brain as early as 1834, which contributed to the standardization of the language of anatomy (Britannica Editors, 2025).

His works, especially *Handbuch der systematischen Anatomie des Menschen* (Systematic Handbook of Human Anatomy), played a role in shaping the anatomical descriptions used in later official nomenclatures such as Basle Nomina Anatomica (BNA), which codified about 5,600 Latin terms and eliminated redundant information, and later developed into Terminologia Anatomica (TA) ((Kinne-Saffran & Kinne, 1994, pp 355-360).

Subsequently, fundamental works appeared that significantly improved anatomical nomenclature.

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Among them, Hyrtl's study in the field of anatomical names, *Onomatologia anatomica*, occupies an important place, in which he concludes, "Anatomical language may have its whims in the choice of words for new terms and concepts, because every language has such whims, but these whims must not conflict with the inviolable rules of grammar and etymology" (J. Hyrtl, 1880, pp. 6-14). Hyrtl's goal was to reform and standardize anatomical nomenclature in order to facilitate communication and education in the medical community. Wilhelm His (1863-1934) played an important role in the development of anatomical terminology.

On the initiative of Wilhelm His's father, the German Anatomical Society discussed the issue of revising anatomical nomenclature at its meeting in Leipzig in 1887, "instructing its board of directors to prepare for the implementation of this undertaking. The reason for this is the anarchy that has existed in this field for years and from which both teachers and students suffer, as well as the harm to scientific research" (His, W, 1895, pp. 1-2). As a result, in 1889 a special commission was set up under the chairmanship of Kölliker (His, W, 1895, p. 3), with the participation of scientists from a number of countries. The list of Latin and anatomical terms drawn up by the commission was adopted at the congress of the Anatomical Society in Basel (1895) and was named the Basel Anatomical Nomenclature (*Baseler Nomina Anatomica* - BNA).

The BNA is based on terms indicating the direction, position, and relationship of body parts in relation to an upright person. Its compilers adhere to the following principles: 1) elimination of synonyms; each part must have one name - Latin, as short and simple as possible. Thus, out of about 50,000 terms used, 4,500 are retained (Eycleshymer, A, 1917, p.10); 2) the name must contribute to quick memorization, but not be a description or explanation; 3) proper names in the names are placed in brackets [e.g. *tuba auditiva* (Eustahii)]; 4) adjectives must indicate their opposites. The BNA contains about 5,600 terms. Identical terms known by different names are combined. This unified anatomical nomenclature has been quickly recognized in a number of countries in Europe, as well as in America, but has not been recognized in France and the United Kingdom (Kachlik, Baca, Bozdechova, Cech, & Musil, 2008, pp. 459-466).

In addition to its influence on anatomical vocabulary, the linguistic role of Latin is based in part on the nature of scientific thinking. The grammatical categories of Latin allow it to create semantically consistent and precise compound words as an integrative language (Rey, 2020). English is the dominant language in medical science, but Latin retains its authority as the reference language for anatomical, histological, and embryological terminology (Tzamaloukas & D'Antoni, 2022). For this reason, in this article, I can analyze the historical development, linguistic arguments, and standardization of the use of Latin in anatomical nomenclature, while also seeking to examine the continuing influence of Latin on scientific and medical language, communication, and education today.

2. MATERIALS AND METHODS

This research uses a qualitative and descriptive methodological framework combining historical, linguistic, and terminological analysis. The aim is to trace the development of anatomical nomenclature from its origins in antiquity to the most recent international revisions, while identifying the linguistic tools that have ensured its universality and continuity. The analysis is based on the study of commonly accepted anatomical nomenclatures, scientific publications, and commentaries, with an emphasis on the influence of Latin as a means of standardization.

Using a historical-linguistic approach, we can reconstruct the development of terms from Antiquity and identify patterns of lexical stabilization and reform. Comparative analysis is used to study the relationship between individual nomenclatures and to determine the ways in which Latin terminology has adapted over time in anatomical science and in changes in educational practices. In addition, a terminological-descriptive approach is applied to focus attention on the structural and morphological characteristics of Latin anatomical terms (derivation, composition, semantic transparency, etc.) that give them precision and durability.

Instead of quantitative indicators, this article emphasizes the qualitative and functional aspects of linguistic stability, consistency, and international comprehensibility. Applying this integrated methodological approach, this study attempts to clarify how Latin has shaped the conceptual and communicative foundations of modern anatomical science and continues to serve as its normative reference system.

3. RESULTS

Despite its contributions, the BNA also has a number of shortcomings. Some names are inaccurate, and linguistic errors remain. With the development of morphological science, anatomical terminology needs

to be refined and supplemented. In 1903, the IFAA (International Federation of Anatomical Associations) was established, which began work on revising the BNA in 1905. Due to the lengthy work, the Anatomical Society of Great Britain and Ireland published its own modification of the nomenclature in 1933, called the Birmingham Revision (Kachlik, D., Baca, V., Bozdechova, I., Cech, P., & Musil, V., 2008, p. 461). The Anatomical Society responded and, two years later, approved its own revision, called *Jenaiensia Nomina Anatomica* (INA, I.N.A.), which focused more on veterinary anatomy, the horizontal position of the body, and made many linguistic corrections. In 1936, the IFAA established the International Anatomical Nomenclature Committee (IANC) to create an international anatomical nomenclature in Latin, but due to the war, it began work in 1952 (Kachlik, D., Baca, V., Bozdechova, I., Cech, P., & Musil, V., 2008, p. 461). The committee's work focused on creating a Latin anatomical nomenclature based entirely on the BNA, as the INA was not approved.

In 1955, the committee created *Nomina Anatomica*, which contained 5,640 terms, about 80% of which were unchanged from the BNA. It is also known as the Parisian anatomical nomenclature - *Parisiensia Nomina Anatomica* (PNA) and was adopted at the Sixth International Anatomical Congress in Paris in 1955 (Britannica Editors, 2024; Kachlik et al., 2008). In 1961 the Paris Anatomical Nomenclature (PNA) was revised and from then on began to be called *Nomina Anatomica NA*. NA underwent a third revision in 1966, a fourth revision in 1977, and a fifth revision in 1983. The sixth revision, published in 1989, was not approved by the IFAA, which appointed a commission called the Federal Committee on Anatomical Terminology (FCAT).

In 1998, this committee published a new nomenclature called *Terminologia Anatomica* or International Anatomical Nomenclature, abbreviated TA98. It is a bilingual nomenclature offering anatomical terms in both Latin and English (Sakai T, 2007). In this nomenclature, all eponyms have been removed. The latest revision of TA98 was made in 2023 and adopted at a meeting in Würzburg. It is called "*Terminologia anatomica 2023 of the Anatomische Gesellschaft-International Anatomical Terminology (TA2023AG)*" (Pretterklieber M. L., 2024). This edition is recommended for use in all anatomy textbooks. It further harmonizes digital and educational standards, retaining Latin as the primary linguistic framework while providing updated English equivalents for broader accessibility (Yamada & Shimizu, 2021).

In summary, the results outline three main theses:

1. Latin has functioned as a stable linguistic axis, maintaining conceptual precision over the centuries.
2. The reforms from BNA to TA2023AG demonstrate a continuous process of linguistic refinement rather than replacement.
3. The use of Latin and English in modern anatomical terminology has proven to be a successful model of diachronic connectivity and successful application in scientific language.

4. DISCUSSION

It is remarkable that as a phenomenon, Latin has been actively preserved in both historical and contemporary aspects to this day in anatomical nomenclature, serving as a mechanism for scientific precision and linguistic accuracy. The results of this study confirm that Latin still performs three important linguistic functions: stability, universality, and semantic transparency. These characteristics have allowed anatomy to maintain a single systematized terminology even in the enormous linguistic diversity of the modern global world and the technological boom in the development of medical knowledge (Williams, 1998; Rey, 2020). As an inflectional language, Latin possesses morphological flexibility, thus making it easy to structure and compose phrases without ambiguity. The fact that descriptive expressions such as *musculus flexor digitorum longus* or *arteria circumflexa humeri posterior* are formed with ease in Latin demonstrates the economy and precision of the Latin language system. These grammatical devices enhance semantic economy and hierarchical structure, features that are absent in modern analytical languages (Tzamaloukas & D'Antoni, 2022).

In addition, Latin also provides a degree of linguistic neutrality. Unlike English, which dominates scientific discourse but is bound up with national and cultural identity, Latin is a "dead yet living language" – free from political ownership and universally accepted in international relations (Whitmore, 2019). This neutrality allows anatomists, educators, and physicians of different linguistic and cultural backgrounds to use a common conceptualized vocabulary. However, the discussions also reveal some problems. The inclusion of English equivalents in *Terminologia Anatomica* (1998) and TA2023AG serves to facilitate access and increase efficiency, especially in medical education – an area where students may not have a classical language training embedded in the curriculum. This bilingual approach has given rise to debate as to whether Latin should still be required in the training of medical professionals (Ghosh, 2021).

Defenders of Latin emphasize its role as the “linguistic skeleton” of anatomy, the structure upon which terminological precision rests. Opponents argue that such a complete transition to English could facilitate learning, but would come at the cost of losing historical and etymological value (Hildebrandt, 2016). A more symmetrical approach is present in modern anatomy. According to the Federated International Program for Anatomical Terminology (FIPAT, 2023), Latin is still considered the official language of reference in the international terminology of anatomy. English translations have been used for worldwide dissemination and didactic clarity in the learning process.

This dual model illustrates a successful combination of tradition and modernity, with Latin as the basis for conceptual rigor and continuity, and English as a means of communicative accessibility. Thus, the debate argues that the preservation of Latin in anatomy is not an anachronism, but a correct strategy for meeting the epistemic needs of medical science. Moreover, the structural precision and semantic transparency of the Latin language itself become means of standardized regulation, so that the anatomical language is both historically accurate and functionally adaptable in an increasingly globalized medical education.

5. CONCLUSIONS

It is on this rational, well-founded basis that I argue that Latin is the universal language of anatomical nomenclature and medical terminology. The intransitive nature of this language system throughout history demonstrates its adaptability to change and scientific progress, but also expresses the consistency of its semantics and syntax. Latin has helped to ensure the global uniformity and comparability of anatomical terms and information and has facilitated the transfer of medical knowledge across generations and cultures (Rey, 2020).

A review of the revisions from the Basel *Nomina Anatomica* (1895) through the *Parisiensia Nomina Anatomica* (1955) to *Terminologia Anatomica 2023* (TA2023AG) is positive; new editions generally carry out their revisions through improvement and refinement, rather than replacement. Anatomical terminology is built and established in Latin as a lexical base, which is confirmed by all existing revisions, although there are bilingual English equivalents that serve mainly educational purposes (FIPAT, 2023). Latin and English coexist in modern medical education in a pragmatic amalgam of tradition and pragmatism.

While Latin provides conceptual stability, morphological precision and etymological clarity, English makes it accessible and promotes its use on a global scale (Tzamaloukas & D’Antoni, 2022). A symbiosis similar to the classical and modern language systems maintains scientific rigor and didactic clarity in the construction of anatomical nomenclature. Future revisions of terminology should retain Latin as the normative linguistic base, not only for historical reasons, but also because of its unique ability to generate systematic and semantically coherent terminology.

As digital health and multilingual resources grow, Latin will continue to provide a reference framework for maintaining linguistic accuracy and for interdisciplinary collaboration. In this sense, Latin is preserved not so much as the result of an outdated classical education, but as one of the most reliable and relevant tools for scientific clarity, standardization, and universalism. Its preservation in the language of anatomy testifies to the fundamental relationship between linguistic order and scientific knowledge, a relationship that characterizes the language of anatomy.

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ANTI-CORRUPTION FOUNDATIONS OF THE STUDENT MOVEMENT IN SERBIA 2024/2025

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Abstract: The paper analyzes the student movement that emerged as a reaction to the death of 16 people in the collapse of a canopy at the Novi Sad railway station, on November 1st 2024. This movement is the response of the student population to lawlessness, social injustice and repression by the corrupt regime. The current student movement in Serbia is a social and political avant-garde, which has not existed in Europe since 1968. In terms of its character, duration, mobilization of citizens and pressure on the regime, this movement has no counterpart even on a planetary level since the beginning of the 21st century. The student movement is by its nature anti-corruption, sovereignist, focused on building legal identity and the rule of law as the supporting pillars of the new order. The author of the paper starts from the hypothesis that anti-corruption is a centripetal force of the student movement that mobilizes citizens in the fight to establish Serbia as a legal state in which the rule of law exists. Student movement influenced the construction of a student protest identity and the formation of a generation of critically thinking and socially engaged youth. The political awareness of Generation Z, the mobilization of citizens and the offering of alternative ways to resolve the institutional, political and social crisis is the legacy of the current student protests. The student movement is deeply rooted in anti-corruption foundations, which dictate a policy of discontinuity and the responsibility of high politics for the abuse of the public interest. The political activism of students in the blockade exposed the corrupt, blackmailing and repressive nature of the hybrid regime and gradually led to a change in the value and political pattern. The student movement has changed tactics and forms of manifestation since its inception, but the demand for a legal state and the rule of law has remained an unchanging variable. As the most credible social actor capable of mobilizing citizens to support its demands, the student movement is becoming a political actor oriented towards institutional changes and the redefinition of political and economic processes.

Keywords: student movement, anticorruption, rule of law, Serbia.

Field: Social sciences (Politology)

1. INTRODUCTION

The right to revolt is a meta-right, an inalienable right that is above all other rights, and over the past half century, this right has been most often exercised by the student population on a global scale. The most famous global student revolt took place in May 1968, and the main protagonists were baby boomers, whose focus was not primarily on existential problems, but on personal, political, and sexual freedoms. The 1968 movement, which originated in France as the cradle of the civil revolution, spread to many European countries. The social engagement of the '68ers under the motto "let us be realistic, let us seek the impossible" was strongly influenced by the intellectual concepts of the Frankfurt School, as well as the theoretical considerations of Lacan and Horkheimer (Pavlović, 2021: 88, 90). The most significant social impact of the French student demonstrations was the general strike of the trade unions, which resulted in the improvement of workers' rights (Pavlović, 2021: 91) and the promotion of violence as a legitimate form of political struggle. In the existing body of scientific knowledge about the legacy of the May 1968 student uprising, there is no consensus, and there are views that these events had a minor impact (DeGroot, 2009: 355), that they were mythomaniac and romanticized, but also opposing views that these events were harbingers of new ideas that shaped new generations (Marwick, 2006: 39). The protests during 1968 could not be characterized as an attempt at revolution, or rather a collective student mobilization that seeks to overthrow the existing regime by force. Terminologically, it is more accurate to classify these events as radical politics that seek to redefine the model by which society functions, through institutional changes and the transformation of political, economic and symbolic processes (Chaumont, 2015: 2). The 1968 demonstrations also spilled over into the then Yugoslavia, primarily to the universities of Belgrade, Zagreb and Sarajevo (Fichter, 2016: 99) and were most intense in the period from 2 to 9 June 1968. The demands of the Belgrade students, which arose in the milieu of Yugoslav socialism, naturally related to social and economic issues such as reducing social inequality, increasing the employment rate, democratizing social organizations (a priori the League of Communists), freedom of expression and assembly, as well as improving the status of universities (material and immaterial). When it comes

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to the position of the university, students demanded their participation in the decision-making process on all important issues, democratic re-election of teaching staff, elimination of clan and monopoly politics in departments, free enrollment in faculties, as well as improvement of the overall material position of the university. Due to the violent reaction of the police forces towards the rebellious students, the Belgrade '68ers demanded the dismissal of police officers at all state levels (local, republican and federal) and the abolition of all protest participants. In the domestic sociological literature on the '68ers movement, critical tones appear about its nature and scope, characterizing it as a politically ambivalent and inconsistent reflection of the internally contradictory Yugoslav society of the time (Popović, 1998: 131).

An indispensable part of the research on student movements in Serbia is the student movement of the 1990s, which was an important agent of civil society in opposing the hybrid regime. Due to the general social situation in the country, the war years and the international embargo, this student movement from its beginnings had horizons and ambitions that went beyond issues of educational policy and university status. In addition to advocating for the autonomy of universities, which was violated by the normative solutions of the politically passionate legislator from 1992 and 1998, the student movement was aimed at the democratization of society. By its nature, this movement, like the opposition and civil movements of the time, was deeply anti-regime. In the last decade of the 20th century, three waves of student protests took place, in 1991/1992, 1996/1997 and 1998-2000. The first wave began after the March 9 protest in Belgrade (March 10-14, 1991) in front of the Terazije Fountain, modeled after the then Eastern European "velvet revolutions", and according to estimates, these demonstrations were attended by 15 to 20 thousand people. The students' demands included: the resignation of Slobodan Milošević, the adoption of a new law that would guarantee the autonomy of universities, the end of the regime's media control, as well as the publication of the names of students who died in the war in Croatia and the resignation of the Belgrade student leadership (Tomić, 2011: 338). The first major student protest was organized in June and July 1992 in Belgrade, on Students' Square and at individual faculties. This time, the students' demands were exclusively political and, in addition to repeatedly demanding the resignation of President Milošević, they also demanded the dissolution of the House of Representatives and the Government, the formation of a government of national salvation, and the calling of multi-party elections for the Constituent Assembly (Tomić, 2011: 339). After a month-long protest, the Law on Universities was passed in August, which was detrimental to political activism at the university, which discouraged students from continuing their protest activities. The student lull lasted until November 1996, when four-month student demonstrations began, the most massive and longest during the harsh 1990s. The demands of the '96ers were less ambitious and more realistic than previous student demands and were a reaction to the regime's resistance to recognizing the results of the local elections held on December 17, 1996. The 1996/1997 student movement demanded the establishment of an independent commission to determine the election results and the resignation of the rector and vice-rector of the University of Belgrade.

2. THE Z GENERATION STUDENT MOVEMENT IN SERBIA 2024/2025

Z generation, as the first global and digital generation in the world (Töröcsik et al. , 2014: 30) for a long time in Serbia was perceived as uninterested in social and political events, led the most massive student and civil protest in the history of Serbia. The student activism of this generation was anti-Bologna and against the market logic of neoliberalism that encroached on their financial opportunities. This generation is formed under the influence of legal gelatinization, media darkness, state capture, privatized institutions, informal institutional patterns and social anomie. The Serbian elite, prone to corruption, repression, and crony capitalism, has determined insurmountable social and economic inequality, which has resulted in distrust in the state and its institutions (Perić Diligenski 2020: 416). The student movement of Z generation in Serbia 2024/2025 is a social avant-garde, unseen on European soil since 1968. The occasion for student organizing was the unfortunate event of November 1, when a canopy at the Novi Sad railway station collapsed, killing 15 people and seriously injuring two, one of whom later succumbed to his injuries. The collapse of the canopy was a trigger due to the existence of well-founded suspicions that informal, corrupt arrangements were involved in the reconstruction of the railway station. After this event, the regime denied that the canopy had been reconstructed, making the tragedy an unpredictable and unexpected force, vis major event, which in theory is conceptualized as a black swan (Jervis, 2009: 475) denying it as a consequence of the human factor. A financial analysis of the reconstruction of the canopy shows that its price was increased many times over through contract annexes (from 1.9 million to 5.2 million euros) and that the contractor was awarded the job on the basis of "friendly consultations", bypassing public procurement procedures. The irresponsibility of high politics, developed clientelistic networks, institutionalized and normalized corruption (Perić Diligenski, 2021: 43), hibernated institutions,

the suppression of rights and its decades-long political instrumentalization have resulted in the deaths of innocent people. The centralization of power in a single political figure, combined with the absence of governance mechanisms and a parallel established order of informal institutions, has led to death, as the most dangerous unintended consequences of political corruption. Death, as the most severe and irreparable repercussions of systemic corruption, is rarely the subject of scientific analysis, but there are studies that also address this issue (Gillanders & Tawiah 2025).

The deaths of 16 people, which sparked demonstrations under the slogan "corruption kills", and the attacks on students of the Faculty of Dramatic Arts while they were paying their respects to the victims, have triggered blockades of state faculties in four university centers (Belgrade, Novi Sad, Niš and Kragujevac) as well as many colleges and private faculties. The students in the blockade have mapped out key problem points, formulated in their demands, which relate to: the publication of complete documentation regarding the canopy collapse, the dismissal of criminal charges against all students and citizens arrested during the protests, the initiation of criminal proceedings against the person who physically attacked them and citizens during the protests, and an increase in budget funds for state faculties by 20%. From the wording of the demands, it is *prima facie* evident that they are primarily aimed at the institutional work of the repressive authorities, primarily the prosecutor's office, which has the power to prosecute. Secondly, the focus of the student movement is on improving the financial situation of the university, the only demand that was fulfilled by regime in early March 2025. After the Belgrade protest on March 15, when a sonic weapon was used during a 16 minutes of silence, the students added another demand on their day, April 4, related to conducting a detailed investigation, establishing all the circumstances and responsibility for that event. The last non-political demand of the student movement related to establishing responsibility for the stay of President Vučić and the journalistic teams in the intensive care unit, where patients seriously injured in the fire in Kočani were hospitalized. Aware of the regime's legal nihilism and deafness to student demands, the student movement formulated political demands par excellence for the first time since the beginning of the blockades. The demands of an ultimatum nature were addressed to the Government of the Republic of Serbia, which was asked to submit to the President of the State, by June 28.6.2025. at 9 pm, a reasoned proposal for the dissolution of the National Assembly with the aim of calling early parliamentary elections. The second request addressed to the Ministry of Internal Affairs related to the termination of the quasi-registered rally in Pioneer Park, colloquially called Čaciland. The Vidovdan demands represent the entry of the student movement into the political field. The Vidovdan protest was a watershed on two levels, political and reactionary, because police repression against protest participants was exposed.

3. THE ANTI-CORRUPTION ETHOS OF STUDENT MOVEMENT

At the core of all aforementioned the students' demands are respect for human rights (primarily the right to life and the right to freedom of expression and peaceful assembly), the separation of powers and its compliance with the constitution and law, as well as the independence of the third branch of government. In short, the students' demands, through their anti-corruption ethos, have the ambition that Serbia has a legal, not a party, sign and that the constitutional principle of the rule of law comes to life. It is necessary that the entrenched rule of people be replaced by the rule of law, which is reflected in a sustainable system of regulations, institutions, norms and community commitments that establish accountability, just laws, open government and justice accessible to the people in a manner most appropriate for governance in accordance with universal principles" (Paleri, 2022: 303). Without the rule of law, it is not possible to restore trust in the state and its institutions, combat systemic corruption and consolidate democracy (Perić Diligenski, 2024: 398). The establishment of Serbia as a state governed by the rule of law is a national issue of the first order for the student movement, for which they walked across Serbia and cycled to the European bureaucratic capitals, Strasbourg and Brussels. Students, united with citizens, through various forms of civil disobedience, are simultaneously fighting on the streets of Serbia for the constitutional order and for the principles formulated in cluster 1, which Serbia, as a candidate country for membership in the European Union, should fulfill. The aforementioned cluster refers to the foundations of a state governed by the rule of law, such as an independent judiciary, respect for human and civil rights, the fight against corruption, justice, freedom and security. In Serbia, as a partocratic and lawless state, anti-corruption sentiments and the will for justice have determined the largest scale of civil disobedience in its history. Aggression and violence against the authorities are not the ambitions or goals of student civil disobedience. The deconstruction of the existing corrupt system, along with the standard claims of civil disobedience that are reflected in the development of moral virtue, civic courage and human dignity (Stevanović, 2005: 1) are the main motives of the peaceful general uprising.

The dominant anti-corruption protest character is visible in the banners from the protests, and one could also speak of anti-corruption protestography. The plenums of all the faculties in the blockade are unanimous in the view that corruption is the most dangerous manifestation of social pathology (Stanković & Perić Diligenski, 2023: 228) which had reflections on the multidisciplinary approach to the corruption phenomenon and proposals for reducing corruption.

The most recognizable protest banner that summarizes the problems of Serbia as a textbook example of a state capture (David-Barrett, 2023: 224) is the message of students of the Belgrade Faculty of Mechanical Engineering - Machines against machinery. Machinery is a synonym for the theoretical construct of a captured, kleptocratic state, in which the public is essentially manipulated by the private, in which the judiciary functions according to the dictates of the executive branch and according to the principle of the Soviet model of telephone justice (Ledeneva, 2013: 160). In a captured Serbia, the law is ignored and circumvented on a daily basis, with an omnipresent democratic deficit, which is reflected in absence of media freedoms, centralization of power, and disrespect for basic human rights. In addition to advertising for future mechanical engineers, biologists also spoke out on the topic of corruption with banners: Corruption mutates faster than viruses, Corruption is not a model organism but it is time to investigate it, Mutations in the system bring deadly consequences - it is time for responsibility, The system is contaminated - we are changing the system. The protestography of the construction profession, which has been the focus of most interest since the fall of the canopy, is reflected in the following messages: We will build prisons against corruption, Attention. The reconstruction of the constitutional order is underway. Future holders of judicial offices, law writers and human rights defenders, inspired by Balašević's verses "There would be no blood if everything was according to the law", have designed banners that directly target those responsible for the abuse of rights. Worth mentioning is the banner referring to Zagorka Dolovac, the Supreme Public Prosecutor - Zagorka, burn us Serbia, as well as the messages: Lawyers want justice, An attack on one is an attack on all, Beating is legal only in obligatory relations, There will be justice only when this empire falls, I will EXPOde, We will also remember who was silent. The anti-corruption message is also sent by the banner of the students of the Faculty of Forestry - We cut corruption, we plant justice, as well as the banner of future doctors - Students heal the system.

The anti-corruption backbone of the student movement is also evident in videos and documentaries about pressing social problems caused by corruption, which were created by students of the Faculty of Dramatic Arts. The anti-corruption identity is supported by the digital identity of Generation Z, which easily follows the technological pace and markets its ideas through social networks. A twenty-minute video about the EXPO 2027 project in an accessible and instructive way indicates to citizens the dangers of implementing the exhibition, which is an overly expensive and inexpedient project, a practical illustration of the theoretical concept of the white elephant (Robinson & Torvik, 2005: 2). In the aforementioned video, students map the non-transparent procedure in the implementation of the corrupt project as well as legal abuses, primarily the derogation of legal procedures on public procurement, thereby raising anti-corruption awareness among citizens. The student movement is the most important anti-corruption force and an extra-institutional substitute for anti-corruption institutions that are passive and have become accomplices of the regime in covering up corruption. In the absence of reactions from the Agency for the Prevention of Corruption and the Prosecutor's Office, which is not initiating an investigation into the cash flows in the reconstruction of the canopy, the student movement is the only anti-corruption messenger that citizens trust. Ergo, the student movement is a centripetal anti-corruption force that educates and mobilizes citizens in the fight for a legal state and the rule of law.

In addition to the socially inappropriate (and possibly unsafe) EXPO 2027 project, the students in the blockade focused on the issue of lithium mining, at the core of which are the lucrative motives of foreign investors and the domestic elite, and the case of the transformation of the Serbian Electric Power Company from a public enterprise into a joint-stock company. The fight against corruption is the backbone of the student political program that should be represented by the student list in the next elections. The student movement sets a priority on a Serbia as a corruption and organized crime free state, which is an overly broad and utopian formulated demand. Corruption as an informal institution cannot be completely eliminated, but it is possible to reduce it and bring it to a level that will not endanger the lives, safety and economic standard of citizens. The student anti-corruption program emphasizes the strengthening of internal control of the police and security services, along with the necessity of blocking the flow of dirty money and the practice of money laundering. An additional proposal is the publication of all commercial contracts concluded by the state with foreign and domestic investors. In order for corruption to become an unprofitable activity, it is necessary to adequately sanction it, which is why the student movement is putting the redesign of prosecutorial and judicial bodies on the political agenda. In this direction, it is proposed to establish an independent and efficient judiciary through the removal of responsible judicial

officials and the appointment of professional staff. Special attention is paid to political corruption, which relates to the very top of the state and has political consequences (Perić Diligenski, 2021: 39) through the proposal to introduce a special prosecutor's office responsible for prosecuting public officials.

4. CONCLUSION

The spirit of the student uprising of 1968 at the University of Nanterre, expanded to the Latin Quarter of Paris, European universities and New Belgrade overpasses as hotbeds of unrest and student rebellion, has found a worthy successor in the movement of students in Serbia in blockade. The student movement of 2024/2025 surpasses its historical predecessors from 1968 and 1996/1997 in its social and political achievements. This movement is not profiled in terms of leadership and did not produce a Serbian Daniel Cohn-Bendit, nor is it inspired by the theoretical reflections of contemporary world intellectuals. It emerged as a reaction of the student population to lawlessness, social injustice and repression of the corrupt regime. It influenced the construction of a student protest identity and the formation of a generation of critically thinking and socially engaged youth. The political awareness of Generation Z, the mobilization of citizens and the offering of alternative paths to resolving the institutional, political and social crisis is the legacy of the current student protests. Raising anti-corruption awareness among citizens is the most socially valuable legacy of student activism. Although it is not sufficient for social change, the protest practice has led to the strengthening of civil society aware of the dangers of informal institutions and social anomie. The student movement is deeply rooted in anti-corruption foundations, which dictate the politics of discontinuity and the responsibility of high politics for the abuse of the public interest. The political activism of students in the blockade has exposed the corrupt, blackmailing and repressive nature of the hybrid regime and gradually led to a change in the value and political pattern. The students in the blockade did not only teach the entire society a lesson in anti-corruption, but also in civil disobedience, courage, empathy and solidarity. The student movement has changed tactics and manifestations since its inception, but the demand for a legal state and the rule of law has remained an unchanging variable. As the most credible social actor capable of mobilizing citizens to support its demands, the student movement is becoming a political actor oriented towards institutional changes and the redefinition of political and economic processes.

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THE ROLE OF DIGITIZATION IN BRAND STRATEGY: IMPACT ON BRAND PERFORMANCE IN THE HOBBY INDUSTRY

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Abstract: This paper examines the role of digitalization in shaping brand strategy and its impact on brand performance within the hobby industry. The theoretical framework highlighted that digitalization represents not merely a technological upgrade but a strategic transformation influencing all dimensions of brand management - from communication and customer engagement to reputation and competitive positioning. By integrating digital tools and platforms, brands can achieve higher levels of interactivity, personalization, and efficiency, thus fostering long-term consumer loyalty and improving overall market performance. The empirical research conducted among residents of South Serbia confirmed a positive correlation between brand digitalization and various dimensions of brand performance, including reputation, awareness, and competence. Although the correlations were characterized as weak to moderately strong, the statistical significance ($p < 0.01$) across all tested hypotheses (H1–H4) validates the positive impact of digitalization on brand performance indicators. Respondents generally perceived digital transformation as a crucial factor in enhancing brand visibility, strengthening reputation, and improving competence in the marketplace. The findings underscore that successful digital brand strategies rely on the ability to combine technological innovation with a deep understanding of consumer expectations. In the context of the hobby industry, digitalization enables companies to expand beyond local boundaries, leverage data-driven insights, and engage with consumers through social media, e-commerce platforms, and other digital channels. Consequently, digitalization not only enhances brand competitiveness but also contributes to the sustainable growth and modernization of the industry. Future research could expand the current study by including a larger and more diverse sample, as well as by employing qualitative and longitudinal methods to explore how digitalization continuously influences brand performance over time. Additionally, investigating mediating factors such as consumer trust, brand authenticity, or digital engagement could provide a deeper understanding of the mechanisms through which digitalization drives brand success.

Keywords: digitalization, brand strategy, brand performance, hobby industry, South Serbia.

Field: Social sciences.

1. INTRODUCTION

Digitalization has transformed marketing by shifting it from one-way communication to dynamic, multi-directional interaction, driven by digital technologies like social media, AI, and data analytics. Key impacts include enhanced personalization and targeting, improved customer engagement through real-time interaction, and a greater emphasis on data-driven decision-making for strategy refinement. Digitalization has also increased reach, made campaigns more cost-effective, and empowered customers to become active participants in the marketing process.

While digitalization is the process of integrating digital technologies into all areas of a business, in order to change how it operates and delivers value, digital branding is the management of a brand's identity and presence across digital channels like websites, social media, and apps. Digitalization provides the technological foundation and strategic shift, enabling digital branding to then build a cohesive online presence, establish customer relationships, and manage a brand's reputation in the digital world.

Digital branding can be defined as the process of creating, promoting, and enhancing a brand through the use of digital technologies and tools, which encompasses a system of values conveyed through a coherent set of identification symbols that share a unified meaning, and fosters positive consumer associations, builds trust in the product, and enhances consumers' willingness to pay a premium compared to competing products, ultimately contributing to improved organizational performance and efficiency (Medvedieva, 2023). Digital branding is specific strategy within brand digitalization. While it is focused on creating and managing a consistent brand identity and presence across various digital platforms, brand digitalization provides the technological infrastructure, platforms, and tools that enable consistent, personalized, and effective implementation of these digital tools and strategies in a digital

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environment.

Digital branding represents a brand communication strategy that uses the internet and digital marketing to strengthen brand characteristics, build its visibility, and improve promotion (Jerez-Jerez, 2022). It's about building relationships and awareness through digital channels. Brand digitalization represents a fundamental shift of a company's operations to incorporate digital tools and strategies. It's about integrating digital into the core business.

Brand performance represents the measurable outcome of digital branding initiatives, typically assessed through indicators such as customer engagement, loyalty, and sales performance. An effective brand strategy requires a balanced integration of brand-building activities and data-driven, performance-oriented marketing tactics, thereby ensuring both sustained brand recognition and short-term business growth.

2. IMPACT OF BRAND DIGITALIZATION ON MARKETING STRATEGIES AND BRAND PERFORMANCE

Brand digitalization refers to the application of digital technologies across all stages of brand management, with the aim of enhancing efficiency, fostering innovation, and strengthening connections with consumers. This process enables the overcoming of limitations inherent in traditional channels while optimizing brand-related activities through the use of digital tools, platforms, and systems (Ramadhani & Indradjati, 2023).

Digital channels like social media, email, search engines and mobile apps facilitate two-way and multi-directional communication, moving beyond traditional one-way advertising. This provides real-time interaction, immediate feedback, and co-creation opportunities, which builds stronger customer relationships and brand trust, and allow brands to reach a global audience more affordably and effectively than many traditional methods.

Brand digitalization emerges as a strategic process that enables companies to transform traditional brand elements into digital formats, thereby aligning their operations with the new realities of the digital era (Denga et al., 2023). It has given rise to new strategic approaches, including social media marketing, content marketing, search engine optimization, pay-per-click advertising, and influencer marketing.

The traditional marketing approach that once limited interaction between customers and sellers has lost its effectiveness in the digital era (Press et al., 2021). The success of digitalization relies on a brand's capacity to integrate technological innovation with a deep understanding of consumer needs and expectations, while effectively addressing the challenges posed by the digital environment (Keller, 2025). The integration of tools, such as social media and influencer marketing, into brand digital strategies has significantly transformed consumer engagement and brand perception (Argyris et al., 2020). Therefore, key impacts of brand digitalization on marketing strategies includes:

1. **Customer-centric approach:** Brand digitalization empowers a customer-centric marketing model by shifting the focus from a company's offerings to the customer's needs and experiences. Data from customer interactions, social media, and web analytics are used to understand their behaviour and preferences, which allows for more relevant messaging and a stronger connection with the target audience. AI and automation enable brands to create customized messages and product recommendations based on real-time user data.

2. **Enhanced market segmentation:** More precise audience targeting allows moving beyond broad demographics to behavioural and interest-based segmentation. Tools like social media ads and search engine marketing enable businesses to deliver their marketing messages directly to specific customer groups. This increases the effectiveness of campaigns.

3. **Expanded channels:** Digital marketing has expanded the number of communication channels available for brands, necessitating an omnichannel approach to create consistent brand experiences across platforms. Social platforms have become essential for building brand communities and engaging with customers through a two-way dialogue, increasing brand loyalty and sales.

4. **Real-time decision-making:** Digital platforms provide immediate data and feedback. Therefore agile strategies can be adopted, quickly adapting to changing trends and consumer behaviour. By measuring campaign performance in real-time, quick adjustments can be made, what helps brands stay competitive and responsive in a dynamic market.

The increasing adoption of digital technologies in business processes substantially enhances their intensity, driving major changes in marketing strategies and enabling faster data processing for addressing ongoing business challenges (Baker & Ellis, 2020). Digitalization within brand strategy entails the strategic utilization of digital channels to convey and reinforce a brand's identity in online environments,

aiming to establish a coherent and seamless customer experience that enhances loyalty and drives sales. Digitalization profoundly transforms brand strategy by transferring brand control from the company to a continuous, data-driven interaction with consumers across diverse online platforms. An effective digital brand strategy establishes a cohesive, engaging, and authentic online identity that strengthens customer loyalty and enhances sales performance.

Brand performance serves as an indicator of a company's strength and competitive position within the marketplace (Dyer, 2023). It can be evaluated through indicators such as market share, profitability, and sales growth (Willekens et al., 2023; Hyder et al., 2023). Digitalization serves as a pivotal driver of modern business transformation, influencing every dimension of brand management and shaping its overall market performance. It facilitates the measurement and monitoring of a brand's market performance, thereby enabling data-informed decision-making and the ongoing refinement of strategic initiatives (Joshi et al., 2021).

The implementation of digitalization has been proven to significantly contribute to enhancing brand performance (Wielgos et al., 2021). Many brands use digital platforms such as social media to engage with customers and build online communities, a process increasingly supported by big data analytics, whose positive impact on market performance has been empirically demonstrated (Ayodeji & Kumar, 2019; Ferraris et al., 2019). This allows brands to reach a wider, even global, audience more effectively than traditional methods. A consistent digital presence across various channels can lead to significantly stronger brand recognition and recall.

Brand digitalization primarily aims to enhance brand awareness, image, and identity, thereby fostering long-term customer loyalty rather than focusing solely on immediate sales generation (Denga et al., 2023). Digitalization transforms branding into a two-way conversation, enabling real-time interaction with customers through social media, personalized email campaigns, and chatbots. By building and fostering strong emotional connections and builds trust, customer satisfaction increases and retention rates boost, affecting long-term brand performance.

Digital brand strategies contribute directly to sales by generating high-quality leads, improving conversion rates, and expanding sales channels through e-commerce platforms. Social media strategies, such as influencer marketing, significantly enhances brand performance by increasing sales and effectively showcasing the brand's distinctive identity (Garzella et al., 2020). Personalization, enabled by data analytics, allows for tailored recommendations and offers that increase purchase intent and revenue.

By optimizing operations through automation and data analytics, digitalization can lead to reduced costs and improved efficiency (Parida et al., 2019). Data-driven decision-making allows better allocation of resources in order to maximize profitability and market share.

Digitalization has introduced new platforms and tools that enable brands to engage more effectively with their audiences. Development of new products and services enabled quick adaption to market changes and evolving consumer behaviour—shaped by greater empowerment and connectivity (Denga et al., 2023). This compelled brands to adjust their strategies to align with changing consumers expectations and differentiate themselves from competitors. Staying current with digital trends is essential for maintaining a competitive edge in the evolving market landscape.

3. MATERIALS AND METHODS

The hobby industry is a diverse market comprising segments like toys and games, arts and crafts, musical instruments, and sports equipment. The hobby industry is a significant global market, projected to continue growing, with a positive outlook for revenue and job creation.

Digital technologies and infrastructures have created new affordances that reshape industries (Autio et al., 2018). Digitalization enabled access to global markets, and brought opportunities for distributed and collaborative initiatives that would not exist without such technologies, which transformed hobbies from mere pastimes into viable and profitable industry (Cunha et al., 2024). Hobby industry market growth is primarily fuelled by increasing disposable incomes, urbanization, a focus on health and wellness, and the desire for social interaction and skill development. At the same time, the industry is undergoing significant digital transformation, characterized by the integration of artificial intelligence, wide use of various applications, and advanced e-commerce platforms.

The aim of this empirical research is to examine the impact of brand digitalization on its market performance within the hobby industry, as well as to identify the key factors that mediate this relationship. Accordingly, the following research questions and hypotheses have been formulated:

- H1: Is there a positive correlation between brand digitalization and brand market performance?
- H2: Do respondents believe that the application of digital technologies has a positive impact on

brand reputation and awareness?

- H3: Do respondents believe that the application of digital technologies has a positive impact on the reputation and awareness of their favourite brand?
- H4: Do respondents believe that the application of digital technologies positively influences brand competence?

The first part of the questionnaire includes questions regarding the socio-demographic characteristics of respondents, such as gender, age, level of education, monthly income, and occupation, while the second part focuses on examining perceptions related to digitalization, brand recognition, competence, and brand performance. Responses were assessed using a Likert scale (1 – strongly disagree to 5 – strongly agree).

Of the total number of respondents, 57% were female. The largest proportion of respondents belonged to the 41–50 age group, while nearly half of the participants were younger than this category. Regarding education, 57% of respondents had completed higher education (college or university), while 26% held a master's degree or doctorate. Only 17% of respondents had completed secondary education. In terms of employment status, 72% of respondents were employed, while the share of unemployed individuals or retirees was only 7%.

Data collected through the survey were processed using IBM SPSS Statistics 20.0 (Statistical Package for the Social Sciences – SPSS, Version 20.0). Before conducting descriptive statistics and correlation analysis using Spearman's correlation coefficient, the normality of variable distribution was tested. The results of the Kolmogorov–Smirnov and Shapiro–Wilk tests, as well as graphical analyses, indicated that the variables were not normally distributed (the significance level (Sig.) was below 0.05) (Manasijević, 2011). Accordingly, non-parametric techniques were applied in further statistical analysis.

Prior to performing the statistical analysis, the reliability of the measurement scales was verified. The reliability test result (Cronbach's Alpha coefficient α) was $\alpha = 0.955$, which exceeds the recommended threshold of 0.70 (DeVellis, 2003). Based on this, it was concluded that the reliability level of the applied measurement scales was satisfactory (Pallant, 2011).

4. RESEARCH RESULTS AND DISCUSSIONS

The measurement of central tendency was conducted using calculated (arithmetic mean) and positional (mode and median) averages, while data dispersion was assessed through the application of standard deviation. Additionally, the study employed Spearman's correlation coefficient, with greater emphasis placed on the results of the mode and median compared to the calculated mean values when interpreting measures of central tendency.

The results of the descriptive statistical analysis of the impact of brand digitalization on its market performance are presented in Table 1.

Table 1: Descriptive Statistic – The impact of brand digitalization on its performance

The impact of digitalization on brand performance	N	Min	Max	Mean	St. Dev.	Med.	Mode
Brand Digitalization				4,34			
BD1	100	1	5	4,21	1,018	5	5
BD2	100	1	5	4,27	0,952	5	5
BD3	100	2	5	4,46	0,846	5	5
BD4	100	2	5	4,41	0,877	5	5
Brand Familiarity				4,27			
BK1	100	1	5	4,15	0,892	4	5
BK2	100	1	5	4,30	0,823	4	5
BK3	100	1	5	4,36	0,882	5	5
BK4	100	1	5	4,27	0,839	4	5
Brand Competence				4,00			
BT1	100	1	5	4,05	0,957	4	5
BT2	100	1	5	4,14	0,954	4	5
BT3	100	1	5	3,96	1,004	4	5
BT4	100	1	5	3,87	0,991	4	5
Brand Market Performance				4,33			
TPB1	100	1	5	4,52	0,810	5	5
TPB2	100	1	5	4,42	0,987	5	5
TPB3	100	1	5	3,95	0,968	4	5
TPB4	100	1	5	4,42	0,890	5	5

Source: Authors

Table 1 presents the results of the analysis of the impact of brand digitalization on specific aspects

of its performance. The range of responses to the questions varies from 1 to 5. Based on the data analysis in Table 2, it can be concluded that respondents largely agree with the given statements (the standard deviation values are around 1), while the values of the mode ($M_o = 5$) and median ($M_e = 4$) indicate that the majority of respondents fully agree, and about half agree, with the statements regarding the impact of brand digitalization on its specific performance indicators.

To examine the impact of brand digitalization on its performance in greater detail, a correlation analysis was conducted. The results of the correlation analysis of the relationship between brand digitalization and brand competencies are presented in Table 2.

Table 2: Correlations analysis - The impact of brand digitalization on brand competence

Brand Digitalization		TPB1	TPB2	TPB3	TPB4
	Brand Competence				
	N=100; Spearman's rho				
BD1		0,319**	0,403**	0,432**	0,495**
BD2		0,382**	0,416**	0,449**	0,418**
BD3		0,390**	0,329**	0,468**	0,367**
BD4		0,508**	0,482**	0,535**	0,457**

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Authors

The correlation analysis presented in Table 2 indicates a positive relationship between the level of brand digitalization and brand competencies — the values of Spearman's correlation coefficient ranged from above 0.3 up to 0.535, with a significance level of 0.01. According to general guidelines, this suggests a weak to “moderately weak” correlation, thereby confirming hypothesis H1. However, although the strength of the relationship is relatively low, the observed correlation is not random, as evidenced by a significance level below 0.01.

In the next phase, the correlation between the level of brand digitalization and its reputation and awareness was also analysed (Table 3).

Table 3: Correlations analysis - The impact of brand digitalization on brand reputation and familiarity

Brand Digitalization		BK1	BK2	BK3	BK4
	Brand Reputation and Familiarity				
	N=100; Spearman's rho				
BD1		0,458**	0,434**	0,452**	0,454**
BD2		0,338**	0,327**	0,402**	0,474**
BD3		0,332**	0,332**	0,363**	0,413**
BD4		0,430**	0,541**	0,411**	0,494**
-		-			
	N=100; Spearman's rho				
	Digitalization of favourite brand				Awareness of the favourite brand
					0,662**

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Authors

Table 3 presents the analysis of the relationship between brand digitalization and brand reputation based on respondents' perceptions. The results indicate the existence of a positive correlation, thereby confirming hypothesis H2. However, since the values of Spearman's correlation coefficient range from slightly above 0.3 to 0.541, according to standard guidelines, this suggests a moderately weak relationship ($p < 0.01$).

Subsequently, the correlation between the level of digitalization of respondents' favourite brand and its awareness was analysed at a significance level of 0.01. The analysis of respondents' attitudes revealed a significant positive correlation ($r = 0.662$), thereby confirming hypothesis H3.

To test H4, the relationship between brand digitalization and brand competence was further examined (Table 4).

Table 4: Correlations analysis - The impact of brand digitalization on brand competence

Brand Digitalization	BT1	BT2	BT3	BT4
Brand Competence				
N=100; Spearman's rho				
BD1	0,342**	0,486**	0,385**	0,420**
BD2	0,290**	0,499**	0,378**	0,479**
BD3	0,257**	0,490**	0,355**	0,336**
BD4	0,430**	0,563**	0,418**	0,482**

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Authors

The results of the correlation analysis (Table 5) indicate a positive relationship between brand digitalization and brand competence, as the values of Spearman's correlation coefficient are positive and statistically significant at the 0.01 level, thereby confirming hypothesis H4. However, since the coefficients range approximately from 0.2 to 0.5, according to standard guidelines, this suggests a weak correlation.

5. CONCLUSION

This paper explored the impact of digitalization on brand strategy and performance within the hobby industry. The findings confirm a positive, though moderate, correlation between brand digitalization and key performance indicators such as reputation, awareness, and competence ($p < 0.01$). These results highlight that digitalization enhances brand visibility, customer engagement, and competitiveness by integrating technological innovation with consumer-oriented strategies. In the hobby industry, digital transformation enables broader market reach and stronger customer relationships, positioning digitalization as a crucial driver of sustainable brand growth.

The results should be interpreted with caution, as the sample size and survey design introduce methodological limits that may affect generalization. The applied analytical methods reflect the studied population but may not capture all factors influencing brand performance in digital contexts. Despite these constraints, the study offers valuable insights: in the hobby industry, digital transformation broadens market reach and strengthens customer relations, serving as a key driver of sustainable brand growth.

Future research should include qualitative methods such as semi-structured interviews, a larger and stratified sample, and open-ended questions to capture respondents' perspectives when predefined options do not reflect their views. While not exhaustive, this study lays the groundwork for deeper exploration of digitalization's role in brand strategy and future, more practically oriented findings. This research clearly shows that we have explored only a small area of this large and complex scientific field. (Mihić,2025)

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SCHOOL CLIMATE AND ITS IMPACT ON STUDENT ANXIETY IN SECONDARY EDUCATION

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Abstract: The study of school climate and its influence on students' anxiety in secondary education represents a current and significant topic within educational and social psychology. Numerous studies confirm that a positive and supportive school atmosphere is crucial for students' psychological well-being and academic progress. Anxiety is one of the most prevalent challenges among adolescents, capable of impairing cognitive performance, emotional balance, and social adaptation. Given that adolescence is a critical stage of personal and social development, anxiety may have lasting effects on mental health and life opportunities. This preliminary study aimed to examine whether, and to what extent, perceived school climate (through the four CSCI dimensions – Safety, Relationships, Teaching Practices, and Institutional Environment) affects anxiety levels (measured via the DASS Anxiety Subscale) among secondary school students. The research was conducted at a medical secondary school in Skopje with a convenience sample of 100 students (30% male, 70% female). Participants were aged 16–19: 34% aged 16, 48% aged 17, 16% aged 18, and 2% aged 19. By grade, 56% were in second, 32% in third, and 12% in fourth year. Results confirmed the general hypothesis that a more positive school climate is associated with lower anxiety levels. The four sub-hypotheses were supported: H₁: Safety was moderately negatively correlated with anxiety ($r = -0.39$, $p = .02$). H₂: Positive relationships showed a moderate to strong negative correlation with anxiety ($r = -0.385$, $p = .001$). H₃: Teaching practices were weakly but significantly related to anxiety ($r = -0.269$, $p = .006$). H₄: Institutional environment demonstrated a moderate negative association with anxiety ($r = -0.36$, $p = .008$). Additionally, H₅ showed that perceived safety and relationships jointly and significantly predicted anxiety ($R^2 = 0.863$; $p < .05$). Demographic analyses indicated: H₆: Female students reported significantly higher anxiety levels than males ($M=20.12$ vs. $M=10.31$; $p < .001$). H₇: Anxiety increased with age (from $M=11.35$ at age 16 to $M=24.68$ at age 19; $p < .001$). H₈: Fourth-year students displayed higher anxiety ($M=19.42$) than second ($M=11.67$) and third-year ($M=15.17$) peers ($p < .001$).

Qualitative insights from focus groups revealed an ambivalent perception of school – seen both as a place of friendship and as a “stressful enclosure” due to excessive testing and authoritarian teaching styles. Key stressors included oral examinations, public presentations, and perceived discrimination, while empathy from teachers and peer relationships provided moments of relief. Students' recommendations focused on more interactive teaching, reduced testing load, stronger emotional support from psychologists, improved hygiene, and an inclusive culture of equality and respect. In conclusion, school climate and demographic factors (gender, age, grade) are significantly associated with students' psychological well-being. To effectively reduce anxiety, interventions should integrate: Methodological innovations – interactive, motivating teaching practices; Emotional and social support – empathetic relationships, open communication with staff, psychologists, and peers; Institutional improvements – enhanced safety, hygiene, fair assessment, and inclusive culture.

Implementing these measures can foster a safer, more supportive, and less stressful school environment, reducing anxiety symptoms and promoting overall student well-being.

Keywords: school climate, anxiety, adolescents, emotional well-being, educational psychology.

Field: Social sciences.

1. INTRODUCTION

The school environment plays a fundamental role in the emotional and psychological development of adolescents. A positive and supportive school climate enhances both academic performance and mental well-being (Cohen et al., 2009). Conversely, negative school environments—characterized by poor relationships, unclear rules, and stressful evaluation systems—can significantly contribute to students' anxiety (Essau & Petermann, 2015; Santrock, 2019).

Anxiety disorders are among the most frequent emotional difficulties in adolescence and can affect cognitive functioning, emotional stability, and social adaptation (Barlow, 2002). Given the complexity of modern educational demands, it becomes crucial to examine how the perceived school climate impacts students' anxiety levels.

The aim of this study is to determine the relationship between the perceived school climate and anxiety among secondary school students and to identify which dimensions of the school climate serve

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as protective factors for mental well-being.

2. MATERIALS AND METHODS

The study was conducted in a secondary medical school in Skopje, North Macedonia, involving a convenience sample of 100 students. The demographic profile included 30% male and 70% female participants; 34% were 16 years old, 48% 17, 16% 18, and 2% 19 years old. Regarding grade level, 56% were in second year, 32% in third, and 12% in fourth year. The instruments used included: Comprehensive School Climate Inventory (CSCI), measuring four dimensions: Safety, Relationships, Teaching Practices, and Institutional Environment; Depression Anxiety Stress Scales (DASS-21), using the Anxiety subscale to assess levels of anxiety symptoms.

Data were analyzed using SPSS 25. Pearson correlations and multiple regression analyses were performed to assess the relationship between school climate dimensions and anxiety. Additionally, qualitative focus group discussions provided complementary insights into students' subjective experiences and emotional perceptions.

3. RESULTS

The general hypothesis—that a more positive perception of school climate is associated with lower anxiety—was confirmed. The results show:

Safety is moderately and negatively correlated with anxiety ($r = -0.39$, $p = 0.02$).

Relationships have a moderate-to-strong negative correlation with anxiety ($r = -0.385$, $p = 0.001$).

Teaching Practices show a weak but significant negative correlation ($r = -0.269$, $p = 0.006$).

Institutional Environment is moderately and negatively correlated ($r = -0.36$, $p = 0.008$).

Multiple regression analysis revealed that safety and relationships together predict 86.3% of the variance in anxiety ($R^2 = 0.863$, $p < 0.05$).

Demographic analyses indicated:

Females reported significantly higher anxiety levels ($M = 20.12$) than males ($M = 10.31$; $p < 0.001$).

Anxiety increased with age ($M = 11.35$ at age 16 to $M = 24.68$ at age 19; $p < 0.001$).

Fourth-year students showed the highest anxiety levels ($M = 19.42$; $p < 0.001$).

Qualitative focus group findings emphasized that excessive testing, public speaking, and teacher authoritarianism are major stressors, while supportive relationships, fair assessment, and empathy from teachers serve as key protective factors.

4. DISCUSSION

The findings confirm that a positive perception of school climate is a protective factor against anxiety, consistent with prior international research (Way, Reddy, & Rhodes, 2007; Shochet et al., 2006). Safety and supportive relationships emerged as the strongest predictors of reduced anxiety. These results align with Bear et al. (2014), who highlight the role of psychological safety and respectful communication in fostering mental stability.

Teaching quality and organized institutional environments also contributed significantly to lower anxiety, resonating with findings by Huang & Cornell (2016) and O'Malley & Ritchey (2015). The exceptionally high variance explained ($R^2 = 0.863$) suggests that combined emotional and environmental factors form a robust framework for predicting student well-being. Although the study sample was limited, the results underscore the importance of emotional safety, empathetic relationships, and transparent institutional policies. Future studies should replicate these findings on larger and more diverse samples and apply mixed methods for deeper validation.

5. CONCLUSIONS

This study confirms that school climate and demographic variables are significantly linked to students' psychological well-being. A safe, empathetic, and well-organized school environment contributes to lower anxiety and improved academic engagement. Key recommendations include:

Strengthening physical and emotional safety through consistent anti-bullying measures and clear behavioral rules.

Promoting empathetic teacher-student communication and peer mentoring programs;

Applying interactive, project-based learning methods and balanced test schedules;

Enhancing institutional transparency and fairness in grading and discipline;

Expanding access to school psychologists and integrating relaxation and self-regulation techniques. Such holistic interventions can transform the school from a potential source of stress into a secure and nurturing environment that fosters growth and emotional resilience.

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USER SATISFACTION WITH THE CHAT GPT IN ATTAINING SUSTAINABLE DEVELOPMENT GOALS

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Abstract: The emergence of artificial intelligence, particularly with the popular tool Chat GPT, has had a profound impact on all aspects of human existence. At the same time, the concept of sustainable development has undergone significant evolution in recent decades, with deepened theoretical understanding and widespread application in academic, institutional, and practical contexts. This evolution has been driven by the fear of depleting resources for future generations. The concept of sustainability is rooted in the idea of balanced economic development, social well-being, and environmental preservation. In modern socio-economic processes, the concept of sustainable development plays a crucial role, as evidenced by the adoption of the Sustainable Development Goals (SDGs) as a fundamental framework for national economies and the planet as a whole. The 5.0 industrial revolution has further integrated the need for continued development of AI and sustainable practices.

The aim of this paper is to assess the level of satisfaction of ChatGPT users in achieving the SDGs. In order to consider both divergent and convergent interpretive directions, various methodological approaches to theoretical concepts were utilized. Empirical research was conducted using an adapted version of the SERQUAL model, with each dimension of the model being applied to the Chat GPT. The study collected primary data from a sample of 250 respondents. The results obtained were processed by calculating the difference between the average values of perceived and expected grades, and by conducting a t-test for dependent (paired) samples. The findings indicate that the respondents expressed a high level of satisfaction with the dimensions of reliability, responsiveness, assurance, and empathy. However, there was a lower level of satisfaction in the dimension of tangibility, suggesting a certain level of dissatisfaction. A statistically significant difference was found between the perceived and expected level of service in all dimensions, except for tangibles, where no significant difference was observed. Future research should examine this topic across at least five countries and enhance the sample size to 500 participants to provide a more comprehensive understanding of the user satisfaction with Ghat GTP in the achievement of the SDGs. Additionally, optimizing the user experience may be necessary to improve the values in the tangibles dimension.

Keywords: Sustainable Development Goals, Ghat GTP, user satisfaction, SERQUAL model.

Field: Social science and Humanities.

1. INTRODUCTION

The Fourth and Fifth Industrial Revolutions have brought AI through the doors as an inspirational guide for innovative solutions, making it a part of everyday private, scientific, and professional-business life. Previous industrial revolutions focused on efficiency and effectiveness, while Industry 5.0 prioritizes sustainability, resilience, and human-centric innovation. It strives for a regenerative economy, ethical technology, and localized production, with the goal of developing systems that contribute to climate responsibility, social justice, and human well-being (Musarat et al., 2023). One of the most significant AI tools in recent years is the development of generative models, with ChatGPT standing out as a large language model that communicates with users in a dialog format, creating text that resembles human language (Milmo, 2023; Lund & Wang, 2023).

Sustainable development and the achievement of its goals are becoming increasingly relevant, as suggested by the industry 5.0 revolution. The depletion of natural resources, environmental degradation, and the consequences of globalization and consumerism have created a serious imbalance between economic, ecological, and social aspects. These issues not only harm natural systems, but also create a resource deficit for future generations. In light of ChatGPT's potential applications in various fields, numerous papers have been published on its use in education, healthcare, social media, sustainability, and energy (4214, 1571, 494, 175, 151, 9) retrospectively (Hussein et al., 2025). Therefore, the goal of this paper is to answer the question: "How satisfied are users of ChatGPT in achieving the SDGs?"

Towards the end of the 20th century, the concept of sustainable development and the question of sustainability gained prominence, as the way of life had significantly changed compared to previous

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generations (Milanović & Erić, 2024). The literature contains numerous definitions of sustainable development, but one that is commonly referenced is the Brundtland definition, which states (WCED, 1987): "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). This definition stands out for its clarity, comprehensibility, and simplicity. The goal of sustainable development is to ensure that the natural resources and raw materials used by society today are not depleted, while also promoting the understanding that it is crucial to preserve these resources for future generations to use (Milanović & Erić, 2024).

The concept of sustainable development is based on three pillars or domains: economic, environmental, and social (Wang et al., 2023:2179). The intention behind the implementation of this concept is to successfully encompass all three pillars and ensure that future generations are able to live with the same level of natural well-being as today. In September 2015, the United Nations defined 17 Sustainable Development Goals (SDGs) (UN, 2016) that align with the principles of sustainability and apply universally to future economic, social, and environmental development (Gudelj, 2019). These goals are accompanied by 169 specific targets, with the aim of achieving them by 2030 (Official website of the United Nations, 2018).

2. MATERIALS I METHODS

During the analysis of the theme, appropriate theoretical concepts and empirical analysis were utilized. The theoretical approach employed methods such as induction, deduction, the historical method, analysis and synthesis, as well as a comparative analysis of ChatGPT's impact on achieving the SDGs. The empirical analysis was conducted using an adapted SERQUAL model. In the following section of the paper, an academic literature review will be presented on ChatGPT's contributions to each of the 17 United Nations SDGs, organized according to the three main pillars of sustainable development.

The first pillar of sustainable development is the SOCIAL, which ChatGPT contributes to by helping achieve its SDGs in the following ways: SDG 1. No Poverty: ChatGPT promotes digital inclusion by providing access to information on employment, financial and digital literacy, job opportunities, and social programs for marginalized groups. It also assists non-governmental organizations and social workers in preparing reports and communication, and supports poverty reduction through digital education and micro-entrepreneurship (Dwivedi et al., 2023; IBM, 2021). SDG 2: Zero Hunger: ChatGPT facilitates the exchange of information on sustainable and smart agriculture, crop management, and food distribution chains in low-income areas. It also enables farmers to access up-to-date data on weather conditions, pest control, and environmentally responsible agricultural methods. Additionally, it contributes to educational campaigns on nutrition and the improvement of food safety policies (Sood et al., 2023). SDG 3. Good Health and Well-being: ChatGPT enhances healthcare by providing reliable health education, mental health support, and basic symptom assessment through AI-powered conversational tools. This contributes to better public health outcomes and facilitates access to health information and advisory services in resource-limited communities. It is also used in campaigns to raise health literacy and reduce health-related misinformation, while encouraging behavior change, early diagnosis, and efficient communication in the field of mental health (Singh, 2023). SDG 4. Quality Education: ChatGPT promotes equitable access to knowledge by providing personalized, real-time assistance and tailored learning, especially for students from remote or economically disadvantaged areas. It supports the development of literacy, numeracy, language skills, and STEM education, while also helping teachers create curricula and adapt instruction to diverse student needs (Holmes et al., 2022; Eric et al., 2024). SDG 5. Gender Equality: ChatGPT contributes to reducing the gender gap by providing women with easier access to digital services, education, and health information, particularly in marginalized or patriarchal settings. It supports gender equality by enabling safe information access and learning, while also assisting non-governmental organizations in creating advocacy campaigns, projects, and communication materials (Ilafi & Nurrohim, 2024). SDG 6. Clean Water and Sanitation: By creating educational materials and assisting in the use of water resource management tools, ChatGPT contributes to raising awareness about the importance of sanitation and water supply planning. Thereby, it supports information and education on hygiene standards, facilitates the communication of sanitation policies, and aids in the preparation of technical documentation (Egbemhenge et al., 2023). SDG 7. Affordable and Clean Energy: ChatGPT facilitates the work of clean energy startups by assisting in the development of project proposals, the translation of energy policy documents, and access to funding for climate initiatives. It fundamentally supports innovation in renewable energy education, the preparation of technical reports, and the exchange of knowledge in the development of sustainable green energy technologies (Bhaskar & Seth, 2024). SDG

11. Sustainable Cities and Communities: ChatGPT strengthens community resilience by supporting local authorities, urban planners, and non-governmental organizations in communicating about sustainable development and engaging citizens in participatory planning (Rane, 2023). SDG 16. Peace, Justice and Strong Institutions: ChatGPT enhances access to justice and transparency by simplifying legal language, facilitating the understanding of rights, and strengthening civic education to foster understanding of personal rights (Shafik, 2025).

The second pillar, the ECONOMIC, also utilizes ChatGPT to achieve its SDGs. SDG 8. Decent Work and Economic Growth: By automating administrative processes, creating various types of content, and improving user support, ChatGPT contributes to increased work efficiency and creates opportunities for new forms of digital employment and entrepreneurial activities (Rahmat et al., 2025). SDG 9. Industry, Innovation, and Infrastructure: large language models support the digital transformation of industries by aiding in research and development, process improvement, and the creation of technical documentation (Musarat et al., 2023). SDG 10: Reduced Inequalities: ChatGPT promotes inclusion by providing access to educational, legal, and health information in multiple languages for persons with disabilities and marginalized communities (Tan, 2024). SDG 12. Responsible Consumption and Production: ChatGPT promotes sustainable consumption by educating about environmental practices, the circular economy, and corporate social responsibility. It also facilitates sustainability reporting and analysis to reduce overconsumption (Rahmat et al., 2025). SDG 17. Partnerships for the Goals: ChatGPT fosters global cooperation by enabling multilingual communication, knowledge exchange among partners, and the creation of international development reports (Dwivedi et al., 2023).

Finally, the third pillar of sustainable development, the ENVIRONMENTAL, applies ChatGPT in achieving its SDGs. SDG 14. Life Below Water: ChatGPT contributes to marine conservation by facilitating the translation and dissemination of oceanology knowledge, supporting educational campaigns, and creating documentation for NGO and UN projects (Egbemhenghe et al., 2023). SDG 15. Life on Land: Nature protection organizations use ChatGPT to prepare grant applications, biodiversity reports, sustainability analyses, and to conduct educational campaigns (Khanifar, 2025).

An empirical study was conducted using an adapted SERVQUAL model. The original SERVQUAL model was first introduced in 1988 (Parasuraman et al., 1988) and later refined by numerous authors (Shi & Shang, 2020), remains an essential tool for assessing service quality. Specifically, the model compares users' expectations to their perceptions across five fundamental dimensions. The authors developed an adapted SERVQUAL model to examine how users assess the quality of the ChatGPT service in the context of activities related to achieving sustainable development goals.

Picture 1. Adapted SERVQUAL Model for Assessing User Perceptions of ChatGPT's Service Quality

Dimension	Definition	Application to ChatGPT
Tangibles	Physical facilities, equipment, and appearance of personnel.	The construct encompasses the aesthetic and functional aspects of the user interface, including ease of navigation, visual design and element composition, and compatibility with other digital platforms. Users perceive certain "tangible" dimensions of interaction through the interface, such as clarity of graphical organization, coherence of visual design, and the user-friendly nature of the chat platform.
Reliability	Ability to perform the promised service dependably and accurately.	Reliability and consistency of responses, emphasizing ChatGPT's ability to provide accurate, coherent, and stable answers across all interactions.
Responsiveness	Willingness to help customers and provide prompt service.	Measures the promptness, accessibility, and readiness of ChatGPT in providing assistance during information or query retrieval.
Assurance	Knowledge and courtesy of employees and their ability to inspire trust and confidence.	Reliability and well-explained responses, along with OpenAI's transparency. Particular attention is given to users' trust in ChatGPT's expertise, ethical conduct, and professional integrity during interactions.
Empathy	Caring, individualized attention provided to customers.	Flexibility to individual user needs, effective adjustment of communication style, and recognition of interaction context; adaptability in tone and content of responses to meet specific user requirements.

Source: Authors creation based on Parasuraman et al., 1988, p. 23.; Young et al., 2024; Nguyen et al., 2025.

In accordance with the above mentioned, the following research hypothesis has been formulated:

H1. ChatGPT users are satisfied with its contribution to achieving the SDGs, considering tangibles, reliability, responsiveness, assurance and empathy.

An empirical investigation was conducted in Serbia between June 2025 and October 2025. Data was collected, processed, and analyzed from a random sample of 250 respondents from various organizations. A Likert-type survey was used to measure user satisfaction with the application of ChatGPT in achieving sustainable development goals, with responses ranging from 1 (totally disagree) to 5 (totally agree). Quantitative analysis of the obtained data was performed using the Statistical Package for the Social Sciences (SPSS).

The sample consisted of 250 respondents, with 165 being male and 85 being female. In terms of age, 59 respondents were under 30 years old, 105 were between 30-40 years old, and 86 were over 41 years old. Out of the total sample, 41 respondents had a secondary school education, 184 had a higher education degree, and 25 had completed master's or doctoral studies. In regards to employment sectors, 21 were from educational institutions, 46 from the trade sector, 45 from the manufacturing sector, 35 from waste management, 28 from financial institutions, 26 from agriculture, 39 from sustainability and energy, and 10 from social media. Finally, out of the total sample, 156 respondents were employed in state-owned organizations and 96 in privately-owned organizations.

3. RESULTS

The results of the empirical research conducted using a repeated measures t-test are shown in Picture 2.

Picture 2. T test of paired samples for testing significance of difference between perceived and expected service

Item	Standard error mean	t	df	p	
TANGIBLES (PERCEPTION OF USEFULNESS AND INTERFACE QUALITY)	Perceived – expected	-0,33			
T1. ChatGPT's interface is easy to use when accessing SDG-related content.	1,02	0,02	43,9	249	0,00
T2. The visual outputs generated by ChatGPT help me better understand topics and save time and effort in research or SDG-related tasks.	- 1,35	0,01	1,28	249	0,06
RELIABILITY	Perceived – expected	1,64			
R1. ChatGPT provides consistent and reliable responses regarding SDG topics.	1,352	1,01	8,13	0,25	0,00
R2. The content generated by ChatGPT is accurate, useful, and helps me better understand the concepts of the SDGs.	1.932	0,05	17,42	249	0,00
RESPONSIVENESS	Perceived – expected	1,075			
RE1. ChatGPT responds quickly to my questions, and the answers are relevant and applicable to my SDG activities.	1,05	0,03	39,67	249	0,00
RE2. ChatGPT effectively adapts to follow-up questions and clarifications.	1,12	0,02	46,32	249	0,00
ASSURANCE (CONFIDENCE IN COMPETENCE)	Perceived – expected	1,03			
AS1. I feel safe and confident using ChatGPT for SDG-related tasks because the explanations are clear and trustworthy.	0.95	0,03	31,5	249	0,00
AS2. I would recommend ChatGPT for education or planning in the field of sustainable development.	1,11	0,02	46,75	249	0,00
EMPATHY	Perceived – expected	1,02			
E1. ChatGPT understands the context of my SDG-related needs and supports inclusive and ethical approaches to sustainability.	1,96	0,02	47,10	249	0,00
E2. I feel supported and encouraged in my sustainability work when using ChatGPT.	0,15	0,07	1,98	249	0,04

Source: Authors calculation

After analyzing the mean values of perceived and expected, it is evident that there is a significant difference between the two for all dimensions except tangibility. This indicates that the respondents are generally satisfied with Chat GPT's contribution to achieving the SDGs in terms of reliability, responsiveness, assurance, and empathy. The highest levels of satisfaction were found in the dimensions of reliability (1.64) and assurance (1.03). However, there is a notable dissatisfaction with tangibility (-0.33), particularly in regards to the visual representations generated by ChatGPT. These visual aids are meant to aid in understanding the topic and save time and effort in SDG-related tasks, but the respondents rated them poorly (-1.35). The t-test for dependent samples further confirmed the statistical significance of the differences between perceived and expected in all service dimensions ($p < 0.05$ and $p < 0.01$), except for tangibles ($p = 0.06$), specifically in regards to the question described by T2. ($p = 0.06$).

4. DISCUSSIONS

Customer satisfaction is an essential requirement for the long-term sustainability and success of any service providing organization, including digital platforms like ChatGPT, as it directly influences loyalty, continued use, and perceived value. The literature review suggests that Chat GTP can be a successful tool in supporting the achievement of the SDGs, but it is not all-power. Authors adapted the traditional SERVQUAL model to the digital service context to assess the level of user satisfaction with ChatGPT in contributing to SDG outcomes in Serbia. More precisely, the hypothesis has been partially supported, according to which Chat GPT users are satisfied with the dimensions of reliability, responsiveness, assurance and empathy when achieving the SDGs, but it has been rejected in the dimension of tangibles. According the aforementioned, significant disparities exist in the perceived quality of service.

The highest degree of satisfaction is shown in the dimension of reliability, that is, the ability of Chat GTP to provide consistent, relevant and supported by explanations assistance when implementing the SDGs. It provides access to precise and structured information necessary for informed decision-making, which is important in education, health, sustainable agriculture and public administration (SDG 3, SDG 4, SDG 2, and SDG 16). Assurance is a second dimension that greatly contributes to satisfaction, as it strengthens the psychological aspect of trust. ChatGPT promotes citizen initiative and institutional transparency by offering precise and comprehensible instructions, simplifying complex terminology, interpreting SDG-related information, and providing administrative documentation to support it. Finally, users appreciated the responsiveness and empathy dimensions of the ChatGPT service. The tool's ability to quickly provide relevant answers and additional clarifications was highlighted, as well as its adaptability to individual communication needs (tone, communication style, and contextual matching). The aforementioned characteristics were highlighted as important for education (SDG 4), health (SDG 3), reducing inequality (SDG 10), and fostering partnerships to achieve goals (SDG 17).

There is a notable level of dissatisfaction among ChatGPT users when it comes to achieving the SDGs, particularly in regards to the tangibles dimension. A closer examination reveals that while users are generally satisfied with the simplicity of the interface, they express dissatisfaction with the visual aspects of the service. This is especially evident in difficulties encountered when generating visual representations and graphic outputs, such as issues with clarity, creativity, and professional design quality. As visual materials play a crucial role in practical education, reporting, and public awareness campaigns surrounding sustainable development and the SDGs, it is crucial to optimize the user experience in order to improve the tangibles dimension.

The study has both theoretical and practical implications, as it is the first of its kind in Serbia to examine the satisfaction of ChatGPT users in achieving the Sustainable Development Goals. This is achieved through the application of the adapted SERVQUAL model, filling a gap in both domestic and international academic literature. The empirical contribution is also significant, as the study focuses exclusively on Serbia and highlights disparities in comparison with similar international research (Wang et al., 2023; Dwivedi, 2023; Rahmat, 2025). However, the study is limited by its relatively small sample size and the potential subjectivity of respondents. This subjectivity may be due to the fact that most respondents primarily use ChatGPT, while overlooking other LLM models such as DeepSeek and others.

Future research should utilize comparative analysis by implementing the adapted SERVQUAL model to obtain more accurate results regarding the satisfaction of ChatGPT users in achieving the Sustainable Development Goals. It is important to note that the significance of individual Sustainable Development Goals varies across national economies due to economic, social, and environmental factors. Developed countries have different priorities compared to developing or underdeveloped countries. For instance, Serbia, which is classified as one of the ten poorest countries in Europe (<https://worldpopulationreview.com/country-rankings/poorest-countries-in-europe>), has distinct priority areas. According to UN data for 2024, Serbia ranks first in the region and 35th out of 166 countries in achieving the Sustainable Development Goals. Given its relative economic limitations, emphasis has understandably been placed on specific goals. Out of all 17 SDGs, Serbia has fully achieved only the goal related to the eradication of poverty (SDG 1) and is making progress towards reducing inequality (SDG 10) (Forbes Serbia, 2024).

In addition to these considerations, the authors stress the importance of expanding the sample size in future studies to a minimum of 800 respondents, preferably with a larger number being preferable as it would involve a wider range of countries. The aforementioned approach enables comparative analyses and cross-cultural validation of results. The contribution of such comparative research would be a more comprehensive understanding of how artificial intelligence technologies, such as ChatGPT, contribute to achieving global sustainability goals in different socioeconomic contexts.

5. CONCLUSIONS

Modern times require the integration of artificial intelligence and sustainable development. Artificial intelligence is significantly altering current business models and impacting personal lives. At the same time, the emphasis on sustainable development is driven by the need to preserve resources for future generations. ChatGPT, a prominent digital AI tool, plays a role in achieving the UN Sustainable Development Goals (SDGs). The research utilized an adapted SERVQUAL model to evaluate digital services, providing a structured understanding of ChatGPT users' satisfaction with regards to sustainability and technological innovation.

In this paper, it has been proven that reliability, responsiveness, assurance, and empathy are highly valued by Chat GPT users. However, there is dissatisfaction with the tangibility, which suggests that there

is a need for ongoing efforts to enhance this aspect in order to fully harness potential of the GTP as a tool of AI for sustainable development. It plays a key role in improving communication, expanding the availability of knowledge, and supporting the resolution of complex problems, representing a significant resource for government institutions, civil society organizations, educational institutions, and the business sector that aim to accelerate the achievement of the SDGs.

Despite the widespread use of the Chat GPT, it is important to not rely on it as the sole source of authenticity. Due to a lack of fact-checking and unreliable sources, information from the Chat GPT may not always be valid. Therefore, users should critically review all results, consult authoritative sources, and seek clarification and/or expert opinion. For example, they can cross-reference information with reputable websites or consult with experts in the field. Additionally, using multiple AI tools could provide a more comprehensive analysis of the possibilities for achieving sustainable development. This would allow for a more well-rounded and accurate understanding of the topic.

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THE IMPACT OF SCREEN TIME AND PARENTAL VERBAL STIMULATION ON SPEECH AND LANGUAGE DEVELOPMENT IN PRESCHOOL CHILDREN

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Abstract: In recent years, the amount of time young children spend in front of screens has increased significantly, raising concerns about its effects on speech and language development during early childhood. At the same time, the role of parents as the main source of verbal stimulation remains crucial for fostering communication and linguistic growth. The present study aimed to examine the relationship between children's screen time, the quality of parental verbal stimulation, and indicators of speech and language development in preschool-aged children. **Methods:** The study included a sample of 440 parents of children aged 3 to 6 years. A structured questionnaire was designed to collect data on: daily screen exposure across different devices (television, computer, tablet, mobile phone); household rules regarding media use; and the quality of verbal communication between parents and children. Data were analyzed using descriptive statistics and the chi-square test (χ^2) to determine associations between variables. **Results:** Findings revealed that 48.0% of children spent up to three hours per day in front of a screen, 43.0% between five and eight hours, and only 7.7% less than one hour daily. This pattern indicates a high level of exposure to electronic media even in early childhood. Furthermore, 71.6% of parents reported maintaining appropriate verbal communication with their child, whereas 28.4% did not. A statistically significant association was found between the lack of adequate verbal stimulation and the presence of speech or language difficulties ($\chi^2 = 43.029$; $p < 0.001$). **Discussion:** The results align with current international findings suggesting that excessive screen exposure reduces opportunities for real-life verbal interaction. Parents who consciously limit screen time and engage in frequent conversations with their children tend to foster stronger speech, vocabulary, and syntax development. These findings emphasize the importance of family-based interventions aimed at improving parental communication skills and establishing healthy media routines. **Conclusion:** Excessive screen time represents a significant risk factor for reduced verbal stimulation during the sensitive period of early childhood. However, the quality and frequency of parental verbal interaction can partially mitigate these negative effects. Parent education programs promoting balanced media use and daily verbal engagement are essential to support optimal speech and language development in preschool children.

Keywords: screen time; parental verbal stimulation; speech and language development; preschool children; family communication.

Field: Humanities.

1. INTRODUCTION

Speech and language development during the preschool years represents a key foundation of children's cognitive, social, and emotional growth. The most intensive period for acquiring linguistic skills occurs before the age of six, when children require rich and varied verbal stimulation through interaction with adults and peers (Hoff, 2013; Kuhl, 2018). However, in contemporary society, electronic media increasingly occupy a central place in children's daily routines, often replacing direct communication and limiting opportunities for spontaneous language experiences (Christakis, 2023).

Recent evidence demonstrates that excessive screen exposure is linked to delayed language development, reduced vocabulary, and difficulties in communication and comprehension (Madigan et al., 2020; Tomopoulos et al., 2021; den Boer et al., 2023). These concerns are particularly relevant for children aged three to five years—a sensitive developmental period in which the quality and frequency of verbal stimulation are essential for later academic and social outcomes (Neumann, 2020; Petersen et al., 2023).

In addition to screen time, the quality of the home communication environment plays a crucial role. Limited or inconsistent verbal interaction between parents and children, combined with elevated media exposure, may further restrict opportunities for linguistic input and interactive learning (Dallacker et al., 2021; Mendelsohn et al., 2021). Conversely, high-quality parental communication—including

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conversation, shared reading, and joint media engagement—represents a protective factor that may mitigate the negative effects of media use (Domoff et al., 2020; WHO, 2019).

In light of these findings, the present study examines two key determinants of early language development: (1) the amount of time preschool children spend in front of screens, and (2) the quality of parental verbal stimulation in the home environment. Investigating these factors may provide valuable insight for developing preventive and early-intervention strategies.

2. MATERIALS AND METHODS

To obtain a comprehensive overview of preschool children's media habits and family communication patterns, a cross-sectional study was conducted with 440 parents of children aged 3–6 years, enrolled in public and private preschool institutions. Convenience sampling was used, and participation was voluntary and anonymous.

Data were collected using a structured questionnaire developed specifically for this research. The instrument consisted of four components:

1. Socio-demographic characteristics (child's age and sex, parental education and occupation);
2. Average daily screen time on weekdays and weekends;
3. Types of devices used by children (television, tablet, mobile phone, computer, gaming console);
4. Mode of media use (independent use or with adult supervision) and family rules regarding screen-time limits.

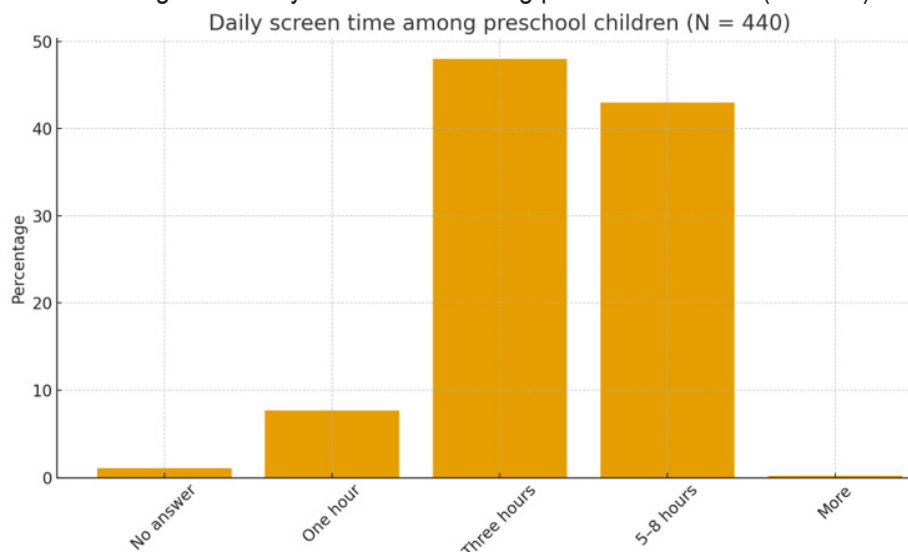
A dedicated section assessed parental verbal stimulation, based on the premise that extensive screen exposure may reduce opportunities for direct adult–child interaction — a critical factor in early language acquisition.

Descriptive statistics (frequencies and percentages) were used to identify patterns of media use and examine potential associations with parent–child verbal interaction and children's speech-language development (Creswell & Creswell, 2018).

3. RESULTS

Analysis of the data provided by the 440 participating parents revealed distinct screen-use patterns among preschool children. Nearly half of the children (48%) spent up to three hours per day in front of screens, while an additional 43% were exposed for five to eight hours daily. A smaller proportion (7.7%) spent up to one hour per day, and only 0.2% exceeded eight hours of daily screen exposure. These findings indicate that a large share of children surpass recommended pediatric guidelines, potentially reducing opportunities for verbal interaction essential for language development (WHO, 2019; American Academy of Pediatrics, 2016).

Figure 1. Daily screen time among preschool children (N = 440)

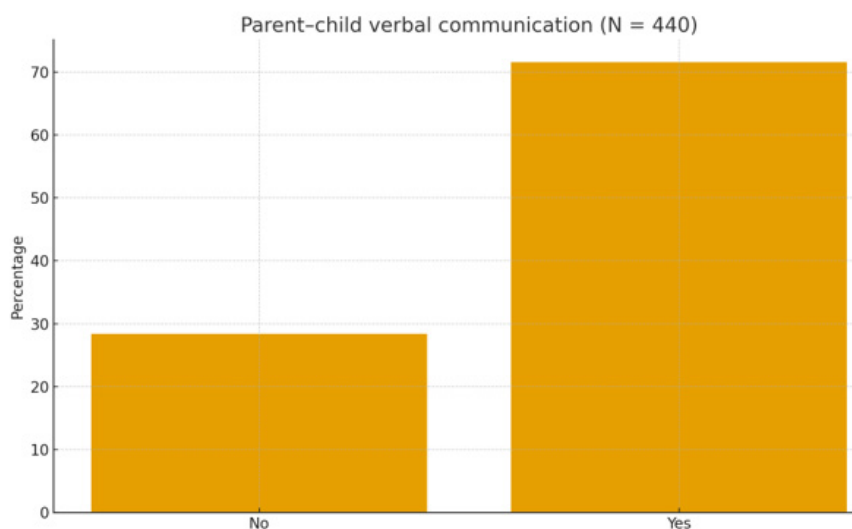


Source: Authors' research

Parental verbal communication

The quality of parent–child verbal communication was also assessed. Most parents (71.6%) reported frequent and appropriate verbal interaction with their child, whereas 28.4% did not. A statistically significant association was found between insufficient parent–child communication and reported speech–language difficulties ($\chi^2 = 43.029$; $p < 0.001$), indicating that reduced verbal stimulation may increase the risk of developmental language challenges.

Figure 2. Parent–child verbal communication (N = 440)



Source: Authors' research

Interpretation of findings

These results reinforce existing evidence that frequent, meaningful verbal interaction — including conversation, shared reading, and play — serves as a strong protective factor in early language development and may buffer the effects of excessive screen use (Neumann, 2020; Mendelsohn et al., 2021). Conversely, limited parental communication and high media exposure appear to create a dual-risk environment for language delay.

Furthermore, the statistically significant relationship between speech–language pathology and the absence of appropriate verbal communication suggests that children lacking consistent verbal engagement at home may be at greater risk for developing or exacerbating language difficulties. Similar associations have been identified in recent European population-based studies, which consistently link limited verbal stimulation in early childhood with poorer vocabulary and comprehension outcomes (Dallacker et al., 2021; Mendelsohn et al., 2021).

4. DISCUSSION

The present study examined the association between screen exposure and parental verbal stimulation in preschool-aged children, highlighting two critical determinants of early language development: the amount of time spent in front of screens and the quality of parent–child verbal interaction. The findings demonstrated that nearly half of the children spend up to three hours daily in front of screens, while an additional 43% are exposed for five to eight hours per day. These results indicate that a substantial proportion of preschool children in the sample exceed recommended daily screen time guidelines, which advise limiting screen use in early childhood to one hour of high-quality content per day, accompanied by co-viewing and interaction (WHO, 2019, AAP, 2016).

In addition to screen time, this study assessed parental verbal stimulation and found that 71.6% of parents engaged in appropriate communication with their children, while 28.4% did not — a significant risk pattern consistent with global and European findings (Dallacker et al., 2021; Mendelsohn et al., 2021; Neumann, 2020; Domoff et al., 2020).

Such elevated screen exposure is concerning, given evidence that early and prolonged digital media use is associated with reduced opportunities for linguistic input, diminished conversational turns, and delayed speech–language milestones (Madigan et al., 2020; Tomopoulos et al., 2021). Research suggests that passive screen consumption and solitary media use displace rich social interaction, which is

essential for vocabulary growth, auditory-processing development, and conversational skills (Neumann, 2020; Christakis, 2023).

In addition to screen time, this study assessed parental verbal stimulation and found that 71.6% of parents reported engaging in appropriate verbal communication with their children, while 28.4% did not. The statistically significant association between insufficient parent-child interaction and the presence of speech-language difficulties underscores the importance of linguistic input and responsive communication in the home environment. This aligns with previous studies demonstrating that frequent, meaningful parent-child interaction serves as a robust protective factor for language development, particularly when coupled with shared book reading and face-to-face communication (Mendelsohn et al., 2021; Dallacker et al., 2021).

Conversely, children who receive inadequate verbal input are at greater risk of delayed expressive and receptive language, a pattern consistently reported in both global and European contexts (Domoff et al., 2020; Neumann, 2020). The current findings strengthen the argument that environmental language richness remains a significant contributor to developmental outcomes, even as digital media becomes an increasing part of children's daily lives.

Taken together, the findings emphasize the need for parental guidance and early intervention programs targeting both reduction of excessive media exposure and promotion of rich verbal interaction. Interventions should focus on supporting parents in establishing structured screen-use practices, co-viewing and discussing content when media is used, and prioritizing daily conversational routines that reinforce language acquisition. Future research should consider longitudinal designs and objective measures of media exposure and language use, to better isolate causal pathways and explore moderating variables such as socio-economic status, parental education, and media content type.

5. CONCLUSION

This study demonstrated that a considerable proportion of preschool-aged children exceed recommended screen-time guidelines, with most children in the sample spending several hours daily engaged with digital media. Such exposure appears to limit opportunities for direct verbal interaction—an essential element of early language development. Simultaneously, almost one-third of parents reported insufficient verbal communication with their children, and this variable was significantly associated with reported speech-language difficulties.

These findings indicate that both excessive screen time and limited parental verbal engagement function as relevant risk factors for early language development. Conversely, consistent, responsive communication from caregivers represents a protective mechanism that can support language skills and potentially buffer the negative influence of digital media.

To promote healthy language development, it is important to encourage balanced and developmentally appropriate media use, family co-viewing routines, frequent verbal interaction, and shared literacy activities. Policymakers, educators, and pediatric professionals should continue advocating for parental education and support in establishing screen-use boundaries and enriching everyday communication practices.

Further research should continue refining evidence-based guidelines and interventions by examining diverse populations, media contexts, and longitudinal developmental trajectories.

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PUBLIC SERVICE MEDIA AND ACCESS SERVICES

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Abstract: Public service media (PSM) play a significant role in national media markets ensuring accessibility to program content and services for people with disabilities. They are trying to implement and increase the amount of content available to people with sensory impairments (sight and hearing), as well as people with mental (intellectual and cognitive) challenges, thus acting in accordance with their legal responsibilities. The aim of this research is to analyse the current situation and the possibilities for further development by the careful consideration of the problems faced by public service media trying to ensure accessibility. Both theoretical methods (analysis, deduction and comparative method) and empirical methods (case study and content analysis) will be used in the paper. The conclusion is that public service media must adapt their contents in accordance with European accessibility standards, which are implemented through the national regulatory framework. While some European service media providers have strict obligations and quotas related to the types of services and the amount of content, public media in Serbia, Slovenia and Croatia, for example, they are legally bound to try to increase the amount of accessible programming based on financial and technical possibilities. Although national laws usually do not differentiate between media service providers (public and commercial), public service media fulfil their obligations to the greatest extent ensuring accessibility by making subtitles, audio-description, sign language and news in easy-to-understand (simple) language.

Keywords: *public service media, access services, subtitling, audio-description, plain language.*

Field: Social sciences

1. INTRODUCTION

In this research, persons with disabilities are considered to be all those, in line with the Convention of United Nations on the Rights of People with Disabilities (UN CRPD), reached on 13th December 2006, “who have long-term physical, mental, intellectual or sensory damages that in interaction with different obstacles can harm their full and efficient participation in society on equal basis with others“. (United Nations, 2006) While available services assume alternative formats to provide equal access and participation in the media for all viewers and listeners of audio-visual content, for the blind and visually impaired there are audio-description and sound subtitles, for the deaf and hard of hearing there are sign language and subtitles. „For the purpose of establishing successful communication of a television-mediated message, which is performed at two levels – logical-intellectual and emotional-affective – it is necessary to compensate the part of the information that cannot be received by persons with disabilities due to their problems with vision or hearing.“ (Ćitić, 2021) For the persons with mental disabilities the accessible contents are the ones adapted through the so-called simple, easy-to-understand language. It is these alternative formats whose presence and production we analyse in this paper concerning the national media services of Serbia, Slovenia and Croatia.

The special significance in modern democratic society is attributed to public media services whose primary task is to respond to all the programme demands of viewer and listener audience in the accomplishment of public interest. This significance has been recognised by the European Broadcasting Union (EBU), the leading world alliance of PMSs, which currently has 113 members in 56 countries, and as reported in the annual report, “has the vision to tend to make public services the most creative, reliable and engaged media today and in the future“. (EBU, 2025) Through versatile directions of activities, EBU has an important role in connecting public media services, exchange of knowledge, ideas and experiences, in this case via a specialised annual conference in the field of TV programe availability for the persons with disabilities (EBU Access Services Community Meeting). Speaking at the conference held in Radio-Television of Serbia in 2023, in which 57 availability service experts participated, the coordinator of EBU group Paul Harrison stated that “all European public media houses are obliged to have accessible services. There will always be challenges, the things are now definitely better than they were ten years ago, and we are still making progress. New technologies are there, constantly being developed, and we only need to take care of having some benefit from their advancement“. (Marinković, 2023) Practice has proven that in the process automatisation of adapting programme contents to the deaf and hard of hearing through subtitles, the advantage is given to the public media services using dominant world languages (English, German, French etc.), while a lot of difficulties in the implementation of the so-called

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Speech-To-Test (STT) softwares are present in the public media services using “minor languages”, to which our regional languages also belong. That is the aggravating factor for enabling the larger quantity of programme contents available to the deaf and hard of hearing persons.

As public media organisations, public media services are obliged in their diverse programme selection to respond to the audience demands for informative, educational and entertainment contents. For example, as given in the Law concerning the work of the providers of the public media service in Serbia, as “independent, autonomous legal subject financed by public and other sources”, it is their duty to “provide the realisation of public interest through versatile, balanced, high-quality programmes regarding informing, education, culture and entertainment in order to accomplish public interest, i.e. to satisfy the needs of all parts of the society.” (Paragraf, 2025) Through this Law, as well as through the Law on Public Informing, the media providers in the sphere of accomplishing public interest are obliged to consider the language and speech standards of the deaf and hard of hearing along with endeavouring to accommodate the programme contents to the blind and visually impaired persons. Similar stipulations are an integral aspect of the other media laws regulating the work of public media services in the countries where they exist. Legal regulations that deal with the media functioning in Croatia oblige the media service providers through the Law on Electronic Media that they “have the obligation constantly and gradually to use proportional measures to make their services more accessible to the children with developmental disabilities and persons with disabilities.” (Zakon HR, 2023) For example, the Law on Audio-Visual Media Services in Slovenia, in the article on the protection of the persons with disabilities, mentions the obligation for “the providers of audio-visual media services to gradually and continually enhance the accessibility of their services to the persons with disabilities through proportional measures, such as translation to sign language, subtitles for the deaf and hard of hearing, speech subtitles and audio-description. (ZavMS-B, 2021) According to this law, every third year media service providers are obliged to submit their report on the completed activities to the Agency for Communication Networks and Services of the Republic of Slovenia. The European Law on Accessibility in Slovenia was adopted in January 2023. This Law implements the EU Directive 2019/882 - The European Accessibility Act (EAA), reached in 2019. The Law has been in force since 28th June 2025 in the European Union, and refers to all media providers having their services available in the territory of the EU. By this, media service providers are obliged to make the availability of their digital editions and audio-visual contents. “The services that provide access to audio-visual media services can include web pages, online applications, applications for digital receivers, applications that can be downloaded, services on mobile devices, including mobile applications and connected players, as well as the services of related television.” (EUR-Lex, 2019: 4) Furthermore, the accessibility of audio-visual media services is regulated by the Directive 2010/13/EU of the European Parliament and Council, with the exception of electronic programme guides (EPG), which are regulated by the last Directive. This obligation is supposed to allow the unimpeded access to linear programme contents on digital video streaming platforms for following both live and delayed TV programmes.

In the analysis of the obligatory European recommendation regarding the accessibility of other services and products, which aid the practicality of everyday life of the persons with disabilities, still “it is expected that the most obvious influence of this law will be in the media sector, considering the requirements for accessibility apply for the services providing access to audio-visual media services.” (Rudec&Margetić, 2025)

2. MATERIALS AND METHODS

In the research concerning the accessibility of public media programme contents, the combined methodological approach was used. The research focused on Slovenia and Croatia, the two EU member countries in the region, which are active members of EBU Access Services Community group. The research included the information regarding the activities of the national public media service of Serbia (RTS), which is also the member of the EBU group and realises the activities of accessible contents placement.

Apart from theoretical frame, the work was based on media practice, so in the research both theoretical and empirical methods were used. Theoretical methods, such as the analysis of the regulatory frame, media service providers' obligations and the very implementation of different alternative service forms. Besides, the given theoretical methods were implemented for quantitative observation of the accessible services used in public media services as a response to fulfilling the legal obligation to comply with the needs of the persons with disabilities in the reduction of barriers in accessibility of audio-visual media contents.

Through qualitative methodology, for the research is based on the understanding of the significance,

practice and accessibility of public media services, we used the case study and contents analysis. For this research, we conducted two semi-structured interviews via e-mail (Interviews with examinees were conducted via e-mail on 10th November 2025). They were given the same questions. The first interview, within the case study of RTV Slovenia, was carried out with Mateja Vodeb, the director of the Department for Accessibility at RTV Slovenia. The project of contents accessibility in the Slovenian public media service was selected for the analysis as an example of good practice in the implementation of different services and the quantity of contents available to the persons with disabilities. The second interview was conducted with Suzana Ivančić, the director of Department for Programme Adaptation for the Persons with Sensory Disabilities at Croatian Radio-Television (HRT). The purpose of the conducted interviews was the analysis of the implementation of programme adaptation policies, i.e. getting the insight of the perception and practice of accessible programmes of these public media services. Within the case study, the research demanded a special analysis of the programme scheme of the RTV Slovenia First Programme in the week from 6th to 12th November 2025, as well as the subcategory Dostopno on the portal of the Slovenian public media service.

3. RESULTS

As stated, the aim of this research was through observing the challenges faced by public media services, to analyse the existing state and the possibilities for further development. When asked in the interview with the directors of departments for accessible programmes of RTV Slovenia and HRT, when these public media services started to introduce accessible services and in which order, Mateja Vodeb answered that the first programme in sign language called Poslušajmo Tišinu has been broadcast for 45 years at the Slovenian national television, and the programme for children Priče iz Školjke, has been broadcast for 40 years, while the main news programmes have been translated since 2009. "We have broadcast subtitles for the deaf and hard of hearing for almost 30 years, and two years ago we upgraded them with subtitles by the live usage of speech recognition for the Slovenian language." Vodeb reported that in 2012 the first movies with audio-description were broadcast. Those were the beginnings. Meanwhile, public media services developed through the introduction of new TV channels and digital platforms, which indicated the need for a systemic approach to this assignment of national relevance. Therefore according to her words, RTV Slovenia since 2016 systemically has been working on accessibility. The introduction of audio subtitles has largely increased the participation of accessible programmes. In the interview conducted for the needs of the research, Vodeb claimed that today RTV Slovenia offers four services available both as linear and non-linear: in live programme, delayed and on demand. Those are sign language, audio subtitles, audio-descriptions and subtitles for the deaf and hard of hearing. Also, as she pointed out, one of the novelties initiated in 2020 at the beginning of the corona virus pandemic, are the news and other articles in the simple language, which are daily published on the site rtvslo.si in the subcategory Dostopno.

The first out of the mentioned four services was the adaptation of the programmes in the Slovenian sign language. "The majority of programmes in sign language are broadcast simultaneously on TV Maribor, live with the interpreter and subtitles. The other programmes, in particular educational and for children, are recorded in advance and broadcast separately", said during the interview the director of the Department for Adapted Programmes of the Slovenian public media service.

According to her, the second service deals with subtitles. RTV Slovenia prepares them in three ways. The first deals with the subtitles prepared ahead for the programmes that have no live broadcast, but are pre prepared for broadcasting: "employees and external collaborators add subtitles to the programmes with the help of speech recognition and manually edit them into the suitable language and equip with time codes (TC). Such subtitles are of high quality. Over a thousand programmes are thus equipped every month. Some programmes with more persons who speak are subtitled with different colours for every speaker so that they could be recognised more easily." She also stated that live subtitles are a special way of preparation. They are mainly prepared for daily informative programmes, and for other live broadcast programme contents. The employees in the Department for Subtitles manually insert those in advance prepared, revised and linguistically edited subtitles in live programmes and, if necessary, combine them with the automatic speech recogniser. The subtitles are mostly of high quality. The third way of programme equipping is represented by automatic subtitles. They are created with the help of speech recogniser and with automatic live language editing. Automatic titles are used in the programmes and live broadcasts, just like in some pre prepared produced programmes. As Vodeb deems, these subtitles are of lower quality than those linguistically revised, but still up to a great degree they fulfil the usage standards in RTV Slovenia programmes. Subtitled programmes are available on web portals and applications of RTV 365

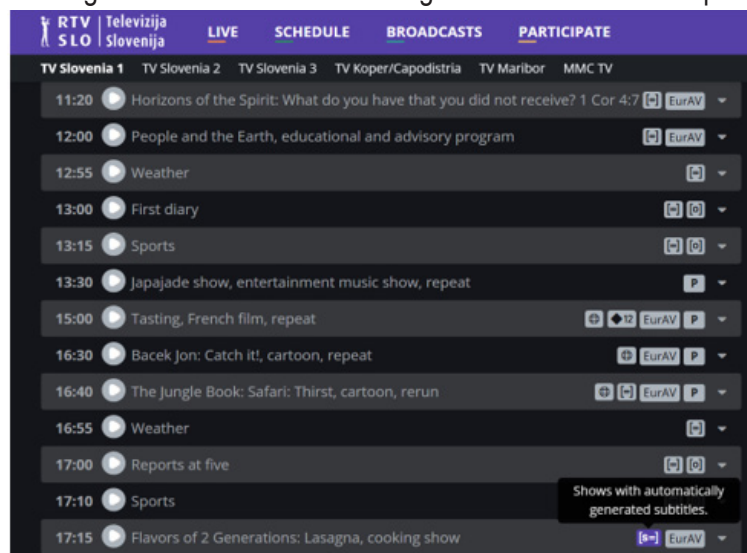
streaming platform for cell phones and smart TV sets.

The third way of adapting programme contents are audio-descriptions for the blind and hard of hearing. RTV Slovenia provides audio-descriptions for diverse documentaries and series, feature movies and programmes for children, along with live programmes during the broadcasting.

The fourth kind of adapting TV programmes concerns sound subtitles. "We also regularly provide audio subtitles for foreign and domestic contents in the programme. Audio subtitles are available everywhere where subtitles are available, except for feature movies and series", said Vodeb. During the interview, she explained how they technically enabled the placement of audio descriptions and audio subtitles. "We emit audio descriptions and audio subtitles on the second audio channel, where broadcast mix is used. They are available via all operators, inside antennas and via web page, as well as in the archives of the RTV365 application."

In the analysed programme scheme in which programme contents were particularly marked with special signs adapted for the persons with disabilities (Figure 1), for the week from 6th to 12th November 2025 all accessible services were present. The subtitles for the deaf and hard of hearing were dominantly present, as well as audio-descriptions for the blind and visually impaired (Figure 2). Special heed should be paid in the programme scheme to the contents made accessible through automatically generated subtitles, by which, regardless of the smaller number of programmes, in terms of the time covered significant programme time schedule since they were present during the morning show *Dobro Jutro*, which lasts from 7AM to 9AM, and just like some other programmes that are informative, entertainment, for children and of other programme kinds.

Figure 1: Programme scheme with markings for RTV Slovenia adapted programmes



Source: RTV Slovenia Internet portal.

During the week of analysing accessible programme scheme, there was a significant quantity of contents that mainly had subtitles and sound subtitles. This service for the blind and hard of hearing was available for 121 programmes, while during the observed week, three contents had audio-descriptions. The featured series of domestic production *Takšno je Življenje* had the audio-description of scenes between audio-dialogues on TV Slovenia for 20 hours. The lack of contents in the Slovenian sign language in the programme scheme was compensated by the extremely high presence of the programmes with subtitles.

Figure 2: Presence of accessible programmes on TV Slovenia 1 in the week from 6th to 12th November 2025

Accessible service	6.11.2025.	7.11.2025.	8.11.2025.	9.11.2025.	10.11.2025.	11.11.2025.	12.11.2025.
Subtitles [=]	32	31	41	33	26	33	31
Automatically generated subtitles [s=]	7	5	6	7	8	6	6
Audio subtitles [o]	18	18	15	10	19	21	20
Audio descriptions [...]	0	1	1	1	0	0	0
Sign language [<]	1	0	1	0	0	1	0

Source: Author's research

Aside from these services available through linear and non-linear following programme contents, the public media service of Slovenia adapts the news and other formats to the people with cognitive disabilities. As Mateja Vodeb stated in the interview, “daily we prepare about 3 pieces of news in the simple language, sometimes even fewer - for instance during weekends. Additionally, we adjust pre-election and pre-referendum debates and the news in emergency or situations of crisis to the technique of easy reading. We select and adjust the most important contents from the central portal. Our target audience is rather diverse – persons with intellectual disabilities, immigrants, less educated, people with reading difficulties, poorer concentration and the elderly.” The simple news on RTV Slovenia portal is available on page Dostopno in the category Enostavno (<https://www.rtvlo.si/enostavno>). They are separated into four categories: Slovenia, World, Sport and Fun. Besides, the information in simple language is available in the categories Prominent Slovenians, Let's Get to Know Slovenia, Useful Information, Important Days and Elections. While the director for accessible programmes of RTV Slovenia Mateja Vodeb in the interview said that the gravest challenges are of financial nature, as well as the slow development of speech and language technologies for the small languages, Suzana Ivančić, the colleague from the Croatian Radio-Television (HRT), emphasised that in their case the greatest challenges are the lack of technical and human capacities for the realisation of a larger quantity of programme content adapted to the persons with disabilities. Asked when HRT began to introduce accessible services and in what order, she replied that the subtitles for the deaf and hard of hearing have been available since 2007, and audio-description since 2015. “Five persons are doing the subtitles for the deaf and hard of hearing, a dozen of external collaborators work as the translators of the Croatian sign language, dramatists, directors and actors for the adjustments via audio-description for the deaf and hard of hearing.”

The public media service of Croatia offers to the users of their programme contents accessible programmes in sign language, subtitles and sound descriptions. The adapted contents are available as linear, through live programme broadcast, as well as non-linear, through delayed following programme contents and on demand. Suzana Ivančić noted that the subtitles for the deaf and hard of hearing are available via TV programme, on HRTi video streaming platform, along with the web platform, where the contents translated into the Croatian sign language are also available, while the contents for the blind and visually impaired with audio-description, apart from the web portal and HRTi, are available in the programme scheme of the third TV channel HRT3. She stated that the annual production of the accessible contents for diverse target groups in 2024 was: “subtitles – 17 865 programmes, or 358 961 minutes, audio-description – 150 programmes, 6 283 minutes a year and sign language – 1 365 programmes, 49 543 minutes.” She particularly accentuated that the subtitles are automatised, all apart from the live subtitles (Dnevnik and Vesti) and that it has substantially influenced the programme accessibility. Besides, which is crucially relevant, they prepare the subtitles with sound descriptions. “Descriptive subtitles are made for all drama and documentary programmes, movies and series for children, as well as for the other programmes in which it is important to describe the sounds for the sake of better plot comprehension. Furthermore, with descriptive subtitles we have made these series accessible: Kotlina, Novine, Crno-Bijeli Svet, and the movies and series for children broadcast on HTV3. All the contents are available on HRTi OTT platform, too.

The examination of accessible services encompassed the programme contents accessible to the persons with disabilities within the RTS programmes, where since 2005 the news programmes are regularly broadcast at 4PM in the Serbian sign language, and in emergency situations all news editions and specialised programmes as well. Following the years of broadcasting in sign language on RTS, the central informative programme Dnevnik 2, since 2022 is broadcast on RTS3 channel in the format more acceptable for the deaf and hard of hearing (the interpreter for the sign language occupies a larger screen space). The tradition of domestic subtitled TV series accessibility by opting for the number 888 on Teletext was established in 2015, whilst since June 2017 Dnevnik 2 is also available with subtitles. "The editorial board of RTS School Programme has been producing the programmes for the deaf and hard of hearing. Hence, the following series were created: Gestovni Bukvar (30 instalments – as many instalments as the number of alphabet letters) and Znakopis (30 instalments – a foreign language course, the sign language is the mother tongue for the majority of persons unable to hear). RTS also produced the first domestic subtitled TV series Mansarda, in which the main character Vera uses sign language, and the programme New Year Mansarda was its sequel." (RTS, 2015) The movie programme adaptation through audio description on RTS began in 2012 in cooperation with the Homer Society, and it went on with the adaptation of domestic feature series in cooperation with the Savez Slepih Srbije in 2019 (series Koreni, Nečista krv, Jutro Će Promeniti Sve, Vera, Nobelovac etc.). In 2025, RTS formed its own team for creating scripts for sound descriptions, as well as for producing descriptive subtitles, which would enable the deaf and hard of hearing to receive information on the sounds via subtitles. Since 2024, once a week RTS3 channel broadcasts series with sound descriptions, and all contents are available on digital video streaming platform RTS Planeta on subpage Pristupačno within which there are also the categories: Znakovni Jezik (SZJ), Audio-Deskripcija (AD) Opisni Titl (CC), Mesto za Nas and Inkluzivni Vodič. (<https://rtsplaneta.rs/Pristupačno>) On this page at every moment 200 titles are available for the persons with disabilities, among which there are all sorts of programmes.

4. DISCUSSION

"Nobody doubts the important role that media accessibility plays, not only in audio-visual translating (AVT), but also in translation studies. Accessibility still is an open concept because its final aim, social integration and removal of dependence barriers, must always be reexamined in relation to the changeable circumstances of our environment and, above all, because the way this is perceived is constantly changing." (Richart-Marset&Calamita, 2020: 9) The results received in the conducted research confirm the hypothesis that public media services tend to respond to the needs of the persons with disabilities and maximally use the available resources aiming to allow the removal of barriers and the greater accessibility to the programme contents. They are not only based on traditional linear broadcasting of accessible programme contents, but they try to make them available for subsequent consumption on their digital platforms in line with the European regulations. "Directive on Audio-Visual Media Services" (AVMSD) states: "The right of the persons with disabilities and elderly to participate and be integrated in the social and cultural life of the Union is unbreakably connected with providing accessible audio-visual media services." In 2019, the EU adopted the Law on Accessibility, with the aim to improve the functioning of inside market for accessible products and services by removing the obstacles formed by different rules in member countries." (Papanikolau, 2022) The practice of Slovenian, Croatian and Serbian public media services has showed that they recognise the public interest of target groups for being informed, educated and entertained. The conducted analysis can be a useful reference point in further following legal obligations in attempting to reduce programme barriers.

5. CONCLUSION

The basic conclusion is that public media services have special responsibility in fulfilling the legal regulations regarding the development, implementation and increase in the presence of accessible programmes. The case study analysing the example of good practice of RTV Slovenia, as well as of the analyses of RTS and HRT services indicate that solid strategy and sensing the needs of a target group can bring enviable results that reflect the positive user reaction, which poses a further motivation for testing and implementing new technologies as useful tools in achieving the final goal – removal of barriers.

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THE ROLE OF TRANSFORMATIONAL LEADERSHIP IN OPEN-SOURCE SOFTWARE DEVELOPMENT: INSIGHTS FROM SURVEY DATA ON ENHANCING ORGANIZATIONAL COMMITMENT AND INNOVATION IN AI-DRIVEN BUSINESS ENVIRONMENTS

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Abstract: To improve organizational commitment and foster an AI-driven, contemporary corporate environment characterized by creativity, adaptability, and agility, this study explores the function of transformational leadership in software development teams. Bass and Riggio's transformational leadership model serves as the framework for the technique, which is grounded in a comprehensive review of the literature. In addition to secondary analysis of the publicly available "Open-Source Software Leadership Survey Dataset", accessible at <https://opensource-survey.org/>, we have also included recent 2017–2024 case studies from software leaders like Google and Microsoft, illustrating various practices. This dataset source, which we plan to further investigate in subsequent primary research for more thorough replication, records survey responses on leadership styles, intrinsic and extrinsic motivation, and commitment measures in open-source software projects. Results should illustrate that leaders who outline imaginative project roadmaps, give personalized mentorship in various tools that stimulate intelligence via hackathons, and model ethical open-source practices. Transformational leadership stands out in contemporary management theory as a style that goes beyond the traditional understanding of leadership and people management. Its essence is reflected in the ability of leaders to inspire, motivate, and encourage employees to overcome their own interests and contribute to the realization of a shared vision of the organization. This paper explores the impact of transformational leadership low and high leadership levels on the organization, employee commitment, and innovation, starting from theoretical premises that link personal development with collective performance. Special attention is paid to the role of managers in creating a stimulating work environment that develops trust, initiative, and readiness for change. Through an analysis of relevant literature and the transformational leadership model of Bass and Riggio, the paper indicates that leaders who encourage creativity, independence, and team spirit create the foundations for the sustainable development of employee culture and innovative behavior. The recommendations support inclusive hiring, gamified sprint evaluations, and specialist training in AI-era motivation. Additional information from the dataset shows that transformational teams had lower turnover and higher job satisfaction in Top3 for low leadership (0.20), with qualitative insights highlighting that high leadership group in Top1 scored highest (0.40) in job satisfaction.

Keywords: Transformational leadership, software development teams, career development, human resources, AI-driven innovation, pair programming.

Field: Social sciences

1. INTRODUCTION

Building AI-driven environments that encourage creativity, adaptability, and agility inside software development teams requires organizational commitment, which is crucial in today's rapidly changing software business (Dakić P. , 2024; Dakić, Stupavský, & Todorović, 2024). According to (Bass & Riggio, 2006) concept, transformational leadership is essential for coordinating developer interests with organizational objectives in order to promote innovation and resilience. Using contemporary industry case studies, literature review from 2017 to 2024 and secondary analysis of the Open-Source Software Leadership Survey Dataset (GitHub, et al., 2024; Zlotnick, 2017), this paper examines how such leadership techniques affect commitment and performance in software teams (Haiderzai, Dakić, Stupavský, Aleksić, & Todorović, 2025).

The modern business environment is characterized by constant changes, dynamic development of technologies and the growing need for organizations to be innovative and flexible. In such conditions, leadership becomes a key factor of organizational success, because the motivation of employees, their commitment and willingness to contribute to common goals depends on the ability of the leader. The focus

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of modern management theories is transformational leadership, which does not only mean managing tasks, but also shaping the values, attitudes and behavior of employees through inspiration and a shared vision of development. Transformational leaders are catalysts of change. They motivate employees not through authority, but through trust, personal example and encouragement of individual growth. With this strategy, employees actively contribute to the creation of a cutting-edge corporate culture that spans several levels and feel more a part of the organization's goals and mission. According to the model developed by Bass and Riggio (2006), idealized influence, intellectual stimulation, inspiring motivation, and tailored care for each team member are the four main pillars of transformational leadership. Regardless of their primary function, leaders can use these factors to impact the growth of a pleasant environment in any industry, boosting team trust and fostering creativity.

The subject of this research is the examination of the way in which transformational leadership affects the organizational commitment and innovation of employees. The aim of the paper is to determine, based on theoretical analysis and review of relevant literature, how leaders can contribute to the creation of an organizational culture that encourages creativity, engagement and long-term employee loyalty.

The paper is structured as follows: an overview of the literature on transformational leadership is given first, followed by an explanation of its relationship to organizational commitment and employee innovation, the main research questions, open-ended questions, and a discussion, conclusions, and suggestions for further research are presented in the sections that follow.

2. LITERATURE REVIEW

The study of leadership throughout history demonstrates how theories and methods have evolved in response to new technologies like artificial intelligence (AI) as well as social and economic conditions. Transformational leadership, which is predicated on the notion that a true leader not only oversees procedures and responsibilities but also transforms those he works with and inspires them to think creatively, holds a distinct position within these contemporary methods (Maksimović, Vlašković, & Damnjanović, 2025), take responsibility and contribute to innovation in various industries (Ali, Ali, Dakić, & Zoltan, 2024).

(Dakić, Lojaničić, Hemed Issa, & Bogavac, 2021) in their work, indicate that the process of selection and development of managers requires a systematic review of the characteristics of candidates, their attitudes and potential, not only formal qualifications. They emphasize that organizations that want to build a competent managerial staff (García-Morales, Jiménez-Barrionuevo, & Gutiérrez-Gutiérrez, 2012) must invest in identification, continuous training and customized development programs that match the individual profiles of employees (Šapić, Furtula, & Aleksić, 2017). (Bass & Riggio, 2006), developed one of the most famous models of transformational leadership, which includes four key dimensions: idealized influence, inspirational motivation, intellectual stimulation and individualized care.

Where (Northouse, 2019), Idealized influence refers to leader behavior that inspires trust and respect, while inspirational motivation refers to the ability to communicate a shared vision (Daud Haiderzai, UI Haq Safi, & Dakić, 2024; Dakić, Lojaničić, Hemed Issa, & Bogavac, 2021) to employees and make it personally meaningful to them. Intellectual stimulation encourages employees to think innovatively and question established patterns, while individualized care involves understanding the needs and potential of each team member while interacting with AI (Todosijević, Dakić, Heričko, Kljajić, & Todorović, 2025). (Goleman, 2020), demonstrates how effective leadership now revolves around AI and emotional intelligence. Based on this, we can conclude that leaders who are aware of their own feelings and who genuinely connect with people are able to generate trust much more quickly and readily. They can also form better teams since they are driven by higher compensation. They also encourage users to adopt new tools and keep connected to them over time, thanks to this emotional awareness.

According (Aleksić, Jerotijević, & Jerotijević, 2019) transformational leadership integrates people's thoughts and emotions with the social and economic realities of their working group. By using these leaders, the team becomes more innovative and adaptable as this mindset spreads throughout the team. While (Alblooshi, Shamsuzzaman, & Haridy, 2021; Nguyen, Mia, Winata, & Chong, 2017) covered that hits eventually foster an environment at work where innovation can flourish and change is tolerable. Therefore, transformational leaders are both strategic change initiators and mentors whose acts transcend conventional hierarchy and management authority.

3. MATERIALS AND METHODS

This study used a mixed-methods approach, combining secondary quantitative analysis with a review of qualitative case studies that cover leadership aspects. While second part and the dataset aspect are covering the Open-Source Survey dataset (GitHub, et al., 2024), which includes 5,500 survey responses gathered from collaborators across 3,800 open-source projects. We are covering data from the previously mentioned dataset, which contains information collected between 2017 and 2024. We are investigating the connections between corporate commitment, employee creativity, and transformative leadership by adding a data dimension to the dataset. All of this is predicated on a qualitative method, which ought to provide us with a better comprehension of intentional linkages. This approach was chosen because it provides an opportunity to study theoretical models and their practical implementations in the human resource management domain.

A variety of data sources, including books, scientific papers, and empirical investigations published in pertinent international journals, were employed in the study. The main criteria for the selection of literature were topicality, scientific foundation, and availability of DOI numbers that confirm the credibility of the source. Special emphasis is placed on research conducted in the last ten years, which deals with contemporary aspects of leadership, innovation, and engagement of employees in organizations of various profiles. Starting from the theoretical assumptions of transformational leadership and its connection with organizational commitment and innovativeness of employees, this research is aimed at understanding how leaders influence the behavior and motivation of employees in modern organizations. Examining how transformational leaders' traits and actions impact workers' development is the aim. This means covering a sense of belonging, a deep emotional connection to the company, and a willingness to follow the organization's objectives. The main study's objective is to determine which elements of transformational leadership are most crucial for low and high leadership levels and to create an environment at work that promotes creativity, experimentation, and the creation of novel solutions that use new technologies.

To better guide our research, the following inquiries about research were developed in light of the described methodological approach and the examined literature:

1. What is the current organizational commitment at the low and high leadership levels?
2. How do transformational leaders foster employees' creativity and inventiveness in using AI?
3. How can transformational leadership increase the effectiveness of human resource management in AI-driven businesses?

These questions examine the connection between leadership style and HR management practices, with a focus on employee development and modeling (Kline, 2023). While in the dataset, we cover motivation and improving organizational culture. Formulated research questions represent the basis for the analysis of theoretical models and findings of previous studies, and their answers contribute to a better understanding of the role of leadership in modern management and the development of innovative organizations.

3. THEORETICAL FRAMEWORK OF TRANSFORMATIONAL LEADERSHIP

Transformational leadership is considered one of the most influential modern concepts that explain how leaders influence the behavior of employees, their motivation and willingness to actively participate in the development of the organization. The theoretical framework of this study is based on the model of (Bass & Riggio, 2006), according to which transformational leadership implies a combination of a visionary approach, emotional intelligence and the ability to inspire employees to overcome personal goals for the sake of wider organizational success.

One of the key dimensions of this leadership is idealized influence, which is reflected in the leader's ability to act as a role model for employees and to build trust and integrity in the team through his behavior. Such leaders do not base their authority on formal power, but on credibility, consistency, and ethical behavior. As (Aleksić, Jerotijević, & Jerotijević, 2019) point out, modern approaches to employee motivation point to the need for managers to focus more on internal motivation, the development of a sense of purpose and mutual trust. Such an approach enables employees to identify with the organization's values and develop an emotional connection with it, which directly affects affective commitment and willingness to take initiative (Roberts, Hann, & Slaughter, 2006). As a result, transformational leaders play two roles: in addition to guiding staff members toward goal achievement, they also foster an atmosphere that rewards creativity, learning, and creative conduct with greater pay (Kljajić & Dakić, 2024).

The discussion of theoretical findings indicates that transformational leadership does not act in isolation, but as part of a wider system of organizational values and HR practices. Leaders who use this

approach create conditions that encourage two-way communication, participative decision-making, and recognition of individual contributions. Such an environment leads to a higher level of organizational commitment and long-term stability of the organization. In the context of modern challenges of digitization, changing work models and growing competition, transformational leadership becomes one of the key factors of organizational resilience. Its application enables organizations not only to adapt to changes, but also to actively create them through continuous improvement and innovation.

3. RESULTS

Through the analysis of modern approaches to leadership, it was determined that transformational leadership has a strong and multidimensional influence on the motivation, innovation and organizational commitment of employees. Leaders who combine a visionary approach with a high degree of emotional intelligence contribute to the development of trust and team cohesion as shown on Figure 1. This kind of environment allows employees to express their ideas, develop professional skills and feel a stronger sense of belonging to the organization.

All analyses were performed using the computational environment described in on a Windows 10 (64-bit) workstation with a multi-core CPU, 64 GB RAM, and SSD storage. The dataset from the Open-Source Software Leadership Survey Dataset (GitHub, et al., 2024) (accessible at <https://opensourceurvey.org/>, released under CC0-1.0 license) was processed through a systematic pipeline implemented in Python (version 3.12.3) using a single comprehensive script following DRY principles. The results show that the most significant effects of transformational leadership (Figure 1.) are visible in the segments related to encouraging creativity and innovative thinking.

Data preprocessing involved several stages: (1) data extraction from the 2024 survey wave; (2) data cleaning and validation; (3) missing value analysis and multiple imputation using iterative Input from scikit-learn; and (4) response consistency validation through logical checks and outlier detection. Descriptive statistics and reliability analyses were performed using pandas (version 2.0.3) and pingouin (version 0.5.3) libraries.

Figure 1. Job Satisfaction by Transformational Leadership Level ($r = 0.58$, $p < 0.001$).



Source: author's contribution

One of the most important contemporary methods for managing human resources is transformational leadership. It transcends conventional ideas of leadership since it is based on leaders' capacity to uplift, encourage, and unite staff members around shared objectives rather than hierarchical power. A corporate culture of trust, cooperation, and creativity is shaped by transformational leaders through emotional intelligence, a visionary approach, and moral behavior.

4. DISCUSSIONS

The conversation highlights transformative leadership as a crucial component of contemporary human resource management (HR). By covering all studies, it can be stated that leaders who combine visionary thinking with emotional intelligence and ethical behavior are. Employee motivation and corporate culture have been shown to be significantly impacted by these factors, as evidenced by the disparities in survey results. This leadership approach is predicated on the leader's amiable capacity to motivate, empower, and unite staff members around shared objectives rather than the authority granted by their contract. Based on this, we have the following findings for our research questions:

RQ1: For this question, we can conclude that transformational leadership has a favorable effect on employees' affective commitment at both low and high levels. Employee loyalty and a sense of belonging to the company increase when they perceive that their needs and ideas are valued. While later from their motivation everyone will benefit in that sector. These results align with current existing and found models that highlight element of enthusiasm and how mutual trust and alignment with organizational principles are the main source for growth. This emphasizes how contemporary management must promote motivation by providing chances for individual development, encouragement, and recognition.

RQ2: The conversation demonstrates how important transformative leaders are to encouraging employee creativity. Encouraging to think "outside the box" and intellectual stimulation fosters an atmosphere where new ideas can be freely created and presented. This strategy gives companies more adaptability and the capacity to adjust to environmental changes. This research part was key to cover that teams that learn and advance through cooperative problem solving and use new tools and technologies like AI, are mostly formed by leaders who promote communication and teamwork. This is an end result that boosts the organization's capacity for innovation and motivates everyone to learn and acquire new skills.

RQ3: We saw that leaders who use transformative methods play a crucial role in attracting, nurturing, and keeping talent in any company. As our earlier study (Dakić, Lojaničić, Hemed Issa, & Bogavac, 2021) highlighted, the need for manager development is a systematic process that involves ongoing education, potential identification, and specialized training programs. Because leaders not only lead but also mold the next generation of managers, this strategy helps to increase organizational efficiency and long-term resilience.

The analysis and results gained demonstrate that transformational leadership is the foundation for the growth of organizations that aim for human orientation, sustainability, and innovation. Leaders become the primary forces behind organizational transformation and the development of a culture of trust. They have to have a defined process for learning and combining emotional intelligence, intellectual stimulation, and personalized care to be successful in their role. This demonstrates that HR is a strategic tool that enhances the organization's competitiveness and long-term success in addition to being an administrative function.

5. CONCLUSIONS

Our main findings, drawn from various studies and existing data, show that transformational leaders boost organizational commitment and employee innovation. The High Leadership group scored highest (0.40) in job satisfaction under this style. This highlights the strong benefits of good transformational leadership. As a result, the company eventually becomes more reliable and effective. Creating an environment that promotes learning, initiative, and the growth of different software development and leadership abilities.

This makes leadership more difficult since every organization needs leaders who respect people, strike a balance between technology and empathy, and manage long-term growth in a favorable manner. Transformational leadership is not just a tool for management. It's a strategy for building organizations. It creates flexible, creative teams that effectively manage change by utilizing trust, inspiration, and common values. Thus, training these executives is essential to contemporary HR procedures.

Future research should examine the reasons for these connections as well as how the effects of other leadership types evolve. It should also look at how contributor motives, project features, and tech backgrounds interact. Future longitudinal research, in our opinion, will enable us to better understand how different styles impact project sustainability and retention in open-source software.

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ARTIFICIAL INTELLIGENCE AS A STRATEGIC TOOL FOR SME GROWTH: FROM PROCESS AUTOMATION TO KNOWLEDGE INTELLIGENCE

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Abstract: The foundation of the majority of national economies, small and medium-sized businesses (SMEs), is severely lacking in knowledge of strategic management and digitization. The strategic and social role of artificial intelligence (AI) in supporting the expansion of SMEs is examined in this article, which moves away from routine process automation and toward higher-order “knowledge intelligence.” This paper proposes a conceptual and empirical model for how AI adoption affects organizational capacities, decision-making process efficiency, and customer value creation. It is based on strategic management and innovation diffusion theories. The study used a mixed-methods approach, and observations from 20 SMEs operating in various technology-intensive industries were complemented by reports analyzed by operations managers and founders. The results show that whereas complementing AI practices are more focused on strategic learning, capability building, and data-driven innovation, early applications of AI are focused on operational efficiency (e.g., predictive analytics, automated workflow, and customer interfaces). The results show that the main factors facilitating AI's disruptive effects are management readiness, data maturity, and entrepreneurial attitude. To help SMEs transition from automation-based efficiencies to lasting competitive advantage through knowledge-intelligent systems, the paper concludes with a strategic roadmap.

Keywords: *strategic management and learning, knowledge intelligence, various technology-intensive industries, operational efficiency, small and medium-sized businesses.*

Field: Social sciences

1. INTRODUCTION

Small and medium-sized enterprises (SMEs) emerged as major sources of innovation, job creation, and economic development, especially for technology-intensive practices (Gunasekaran et al., 2011; Kraus et al., 2021). Furthermore, they were inherently structurally constrained compared to large firms, including limited financial and human capital, a lack of skills, and diminished bargaining power in the global value chain (Li, 2011). Digital technologies, and, increasingly, AI, were seen in this light—as both an opportunity and a risk (Haiderzai et al., 2025; Dakić et al., 2024, June). AI brought cost savings, enhanced decision-making, and value creation potential for SMEs, but small businesses still found difficulties in converting this opportunity into scalable and deployable solutions (Davenport & Ronanki, 2018; Vial, 2019).

Artificial intelligence (AI) is a mix of technologies that allow machines to perform some cognitive capabilities, including perception, prediction, pattern recognition, and decision-making, required by human intelligence (Iansiti & Lakhani, 2020). In reality, SME AI solutions included everything from simple predictive systems (demand forecasting, churn prediction, anomaly detection) to sophisticated diagnostic, recommendation, and generative services in various industries, such as autonomous vehicles (Ali et al., 2024; Dakic et al., 2024, October), and yet uptake remained essentially aligned with goals that focused on efficiency (Davenport & Ronanki, 2018; Ransbotham et al., 2021). From the strategic perspective, that begs the question of when AI transitioned itself from being an operational tool to a source of knowledge-based competitive advantage. In the context of the digital economy, the roles played by data, algorithms, and digital tools could be realized, as long as they are integrated into the organizational way of working, as well as leadership, culture, and learning habits (McAfee & Brynjolfsson, 2012; Felin et al., 2023). These AI-related capabilities posed particularly challenging challenges on the part of SMEs, as they had few IT frameworks and resources available to manage all aspects (Khin & Ho, 2019; Kraus et al., 2021).

Previous literature on digital transformation and AI adoption indicated that technology alone could not determine outcomes; for example, management readiness, employees' skills and beliefs, and a culture that was amenable to experimentation also mattered (Sousa & Rocha, 2019; Vial, 2019). Earlier studies indicated that SMEs generally took this stepwise path, beginning with low-level, efficiency-centric-style pilots, and then moving, in some cases, to more advanced, digital, or AI-driven initiatives in products, services, and business processes (European Commission, 2020; Sjödin et al., 2018). This trajectory can be expressed as an S-curve of maturity in digital and AI, with gradual gains early, accelerated

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enhancements as data and capabilities are acquired, and saturation at a point (Sjodin et al., 2018). In this environment, the current research explored three enablers of AI adoption in SMEs: management readiness, data maturity, and entrepreneurial attitude (Maksimović, Vlašković, & Damjanović, 2025).

Management readiness captured leadership perceptions about the strategic possibilities of AI and the drive to connect AI projects to the organizational objectives (Davenport & Ronanki, 2018; Sousa & Rocha, 2019). Data maturity was indicated by the quality, integration, and availability of the data infrastructure needed to train and deploy AI models (McAfee & Brynjolfsson, 2012). Entrepreneurial attitude was described as the willingness to take risks, experiment, innovate, and explore new business models beyond narrow efficiency optimization (Kraus et al., 2021; Zeng et al., 2021). Although growing interest in AI and SMEs is evident, much of the literature still focuses on large organizations or even treats small and medium enterprises as a single group. Thus, it offered little in the way of insights into how different SME profiles—those characterized by management readiness, data maturity, and entrepreneurial attitude—were associated with different phases of AI adoption and when it transitioned from process automation to knowledge-intensive, strategic AI (European Commission, 2020; Ransbotham et al., 2021). This study sought to address that gap by exploring AI adoption in a sample of 20 technology-intensive SMEs that had successfully implemented at least one of these AI solutions (Todosijević, Dakić, Heričko, Kljajić, & Todorović, 2025). It separated into an early stage, when AI was employed primarily for operational activities (e.g., predictive maintenance, demand forecasting, and route optimization), and a complementary stage, when AI supported strategic decision-making, knowledge-intensive service provision, and customer-driven value innovation (e.g., diagnostic decision support, personalized learning, climate optimization, and contract intelligence).

Data maturity, entrepreneurial attitude, and management readiness for each SME were assessed through staged profile analysis. We generated tables and figures summarizing adoption stage distributions, enabler profiles, industry coverage, and a conceptual S-curve of AI maturity across the 20 cases. In doing so, the paper empirically presented a three-phase view of AI maturity for SMEs (Automation, Data Intelligence, and Knowledge Intelligence), which aligns them with the innovation diffusion and digital maturity models but is unique for AI-enabled SMEs (Sjodin et al., 2018). It demonstrated how the management readiness, maturity of data, and entrepreneurial attitude also increased systematically among SMEs that were able to perform the knowledge-rich, complementary use of AI, and that management had a roadmap to go from isolated efficiency pilots to the knowledge-based AI capability in an isolated environment. Apart from technical and data skills, the research underscored the significance of managerial skills in the exploitation of AI value. Earlier works speculated that open innovation might help develop these skills of AI-rooted systems by enabling management learning beyond organizational environments and ecosystems (Papić, Gutić, Pantelić, & Petrović, 2023). The high importance of management readiness of complementary adopters was interpreted as an indication that managerial capabilities had to evolve with the maturity of AI, and open innovation channels—such as collaboration with external AI vendors, startups, universities, and customers—could provide this process with facilitation (Papić et al., 2023). In accordance with the mentioned information, the article is organized in the following way and contains the sections Introduction, Materials and Methods, Results, Discussion, and Conclusion.

2. MATERIALS AND METHODS

This study used a mixed-methods approach, examining secondary quantitative analysis and qualitative case studies that discuss AI adoption in SMEs. The adoption of AI in SMEs and whether and under what circumstances AI helps the transition from automation to knowledge intelligence. The methodology incorporates quantitative examination of the primary organizational enablers to AI adoption and cross-case, qualitative analysis of AI use cases, perceived value, and organizational change. Strategic management, the resource-based view (RBV), innovation diffusion theory, and the three enabling factors—management preparedness, data maturity, and entrepreneurial attitude—form the foundation of this study.

2.1 Sample and Collection of the Data

The empirical material comprises 20 SMEs in technology-intensive sectors (e.g., manufacturing, healthcare, fintech, logistics, creative industries, legal tech, and agtech). The following conditions were applied to all firms: They meet European Commission SME standards (number of employees and turnover). They are set in an area where digital and AI solutions are possible and relevant. They have rolled out at least one AI solution beyond just automation of the office (e.g., predictive analytics, anomaly detection, recommendation systems, generative design, and decision support). Data were collected in two primary manners: fully structured reports and analyses performed by operations managers and/or founders, which included company, industry, and AI use case descriptions. Self-reported scores (1-5 Likert

scale) on management readiness, data maturity, and entrepreneurial attitude. Benefits and challenges in terms of perceived aspects of AI adoption. Evidence was collected in-text and by secondary sources, i.e., internal reports, project descriptions, or publicly available information provided for reference. Combined, this enabled triangulation of data concerning the manner in which AI is put into practice, what is interpreted as its benefits, and how the organizational context underpins or inhibits the application of AI.

2.2 Measures and Operationalization

Three fundamental enablers were operationalized as follows: Management Readiness—perceived strategic understanding of AI, leadership focus, sponsorship support for AI initiatives, and willingness to embrace changes in ways of working. On a scale ranging from 1 to 5 in terms of readiness (1 is very low, 5 is very high). Data Maturity—quality, integration, and availability of data, implementation of basic data governance practices, and availability of data infrastructure that may support AI. Approximated on a 1–5 scale (1 = very low data maturity, 5 = very high data maturity). Entrepreneurial Attitude—openness to experimentation, taking chances and risks, and seeking out new business opportunities in AI-enabled business models or services. Assessed on a one-to-five scale (1 = very low entrepreneurial attitude, 5 = very high). The main AI application was classified into two main categories for each SME: Operational Efficiency (for example, predictive maintenance, demand forecasting, route optimization, automated workflow, and churn prediction) or Strategic Knowledge Intelligence (e.g., diagnostic decision support, personalized learning, anomaly detection for cyber risk, generative design, contract analysis, and climate optimization). Depending on the character of the use case, as well as the use of AI in the organization, each SME had been categorized into one of the two AI adoption stages: early—AI that is mainly used for operational efficiency and small increments in processes. Complementary—AI in strategic learning, decision-making, capabilities improvement, and customer value innovation.

Data analysis involved three stages: Step 1: Descriptive and comparative analysis. The descriptive statistics were calculated for the three enablers (management readiness, data maturity, and entrepreneurial attitude). The SMEs were ranked by AI adoption stage: early vs. complementary, with the mean score for each enabler computed. This enabled an intuitive exploration of how enabler profiles cluster within stages and across stages and therefore across different functionalities. Step 2: Conceptual and cross-case synthesis. Qualitative descriptions of the AI use cases, perceived benefits, and organizational changes were presented using a cross-case comparison design. Main categories of AI benefits were then coded as follows: cost reduction and efficiency, operational speed and reliability, decision accuracy and risk reduction, innovation capability, and customer value creation. We then mapped these codes onto a three-phase conceptual model of AI maturity in SMEs: Step 3: Automation—AI powers basic efficiency and process automation. Data Intelligence—AI and analytics help with data-informed decision-making. Knowledge Intelligence—AI is entrenched in core organizational knowledge and learning activities. To indicate these stages, a conceptual S-curve of AI maturity (Figure 4) was sketched to elucidate these phases and to link the empirical patterns to emerging theories of innovation diffusion and digital maturity.

2.3 Ethical Implications

Due to the exploratory and practical approach, all participating SMEs were treated with strict confidentiality. Company names referred to in the tables and figures are pseudonyms (for example, AlphaTech Manufacturing, MedInsight, and SecureSight) to safeguard privacy but also to convey the context of the particular sector. No sensitive financial data were collected, and all assessments are provided in an aggregated form or are anonymized.

2.4 Limitations of the Methodology

The selected design is exploratory and illustrative instead of being statistically representative. The sample of 20 SMEs is small, which makes it biased in favor of technology-intensive sectors and businesses that have employed one or more AI solutions already. Accordingly, the results are not intended for general statistical interpretation on a large scale but rather to provide theoretical clarity and the design of a strategic roadmap for further empirical research to be undertaken about AI maturity in SMEs.

3. RESULTS

The empirical analysis of 20 technology-intensive SMEs contributes new insight into the practices through which AI is currently adopted, with some of the organizational profiles defining varied stages of AI adoption. We have found the following companies: AlphaTech, NeuroRetail, MedInsight, AgroVision, CleanEnergySolutions, FinWise, EduLearn, LogiFlow, SecureSight, AutoSense, SmartBuild, FoodChainAI, FashionFit, HotelEase, GreenGrow, LegalAide, ArtVision, HealthTrack, MarketPulse, and OceanWatch. Major enablers are driving the change from efficiency-oriented to knowledge-intelligent AI deployment. The findings are provided in the sequence that corresponds to the succeeding figure and tables.

3.1 The Stages of AI Adoption and the Sample Overview

The sample included 20 SMEs from various industries that had implemented at least one AI solution. From 20 SMEs, 13 (65%) were placed in the early stage, and 7 (35%) in the complementary stage. Early adopters used AI primarily to improve operational efficiency in areas such as predictive maintenance, dynamic pricing, route optimization, inventory optimization, and churn prediction. Complementary adopters used AI in roles that required more knowledge (for example, support for diagnostic decision-making, personalized learning, cybersecurity anomaly detection, generative design, contract intelligence, and climate optimization). The SMEs were situated across 20 technology-intensive industries such as manufacturing, healthcare, fintech, logistics, education, cybersecurity, fashion, hospitality, agtech, legal tech, creative industries, marketing, and maritime. The distribution of industries illustrates this cross-sector impact for AI; each industry was represented by at least one case (Figure 1).

3.2 Enablement profiling of stage of adoption

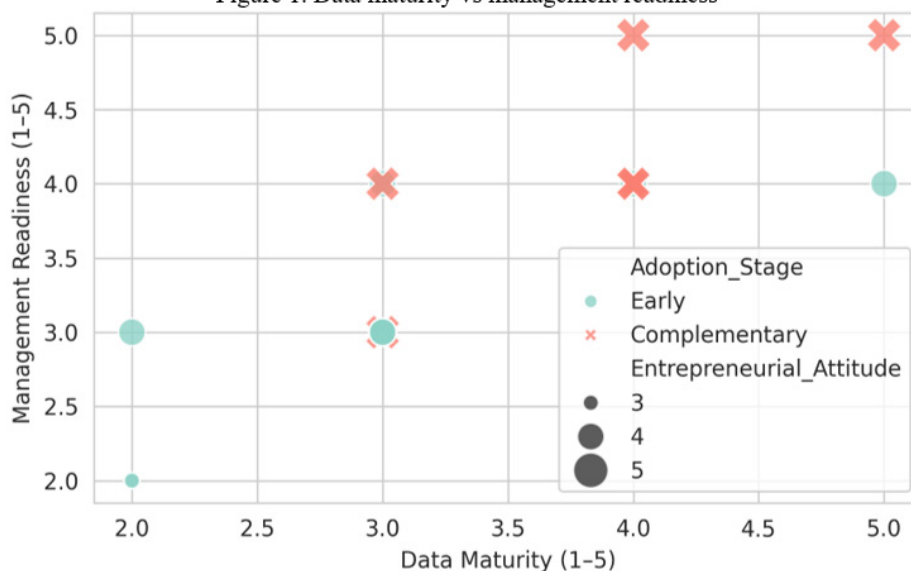
Three enablers were rated on a 5-point scale for each SME: management readiness, data maturity, and entrepreneurial attitude. Our findings show the mean value of each of these enablers by stage of adoption, where complementary adopters scored significantly higher on all three enablers compared to early adopters on average: Management readiness shows that early: mean score ≈ 3.08 . Complementary: mean score ≈ 4.14 . Data maturity. Early: mean score ≈ 3.00 . Complementary: mean score ≈ 3.86 . Entrepreneurial attitude. Early: mean score ≈ 3.85 . Complementary: mean score ≈ 4.86 . Differences between stages were positive and meaningful for each enabler. The gaps in management readiness and entrepreneurial attitude were most obvious and also more significant with the transition to the Complementary stage in that data maturity increased significantly.

3.3 Data maturity and management preparation

The data maturity and management readiness relationship was analyzed with the help of a scatter plot (Figure 1). On the x-axis, maturity of the data was plotted, and on the y-axis, management readiness; marker size was the level of entrepreneurial attitude, and colors and shapes indicated the stage of AI adoption. A positive relationship between maturity of data and management readiness was indicated with a scatter plot. SMEs with higher data maturity were also to report more management readiness. Complementary adopter firms were predominantly in the upper-right of the plot, being high in data maturity coupled with high management adoption readiness and usually larger marker sizes (higher entrepreneurial attitude). Early adopters were clustering relatively near the center and lower left side, suggesting a relatively low degree of both enabler presences.

Figure 1. Data maturity vs management readiness

Figure 1. Data maturity vs management readiness



Source: author's contribution.

4. DISCUSSION

Results of the 20 SME case studies revealed new perspectives with respect to the degree to which AI has been adopted in technology-intensive SMEs and when it has moved on to a knowledge-based competitive advantage as a way of transforming from an operational efficiency tool. This section introduces the major empirical trends while considering the theoretical background based on strategic management, the resource-based view (RBV), and innovation diffusion theory. We managed to cover that most SMEs are in the early stage, deploying AI primarily on operational tasks like predictive maintenance, pricing, routing, inventory optimization, and churn prediction. Which aligns with the existing literature indicating that AI adoption starts with routine, structured processes (Davenport & Ronanki, 2018; Ransbotham et al., 2021).

A smaller number of Complementary Adopters used AI in knowledge-intensive domains—diagnostic support, personalized learning, anomaly detection, generative design, contract analysis, and climate optimization—resulting in improved decision accuracy, service innovation, and customer value. This is consistent with RBV arguments that AI becomes strategic when embedded within organizational capabilities (Felin et al., 2023). Perceived benefits emerged in a phased manner. Automation—efficiency, data intelligence—accuracy and customer value, and knowledge intelligence—innovation and strategic learning, enabling the incremental processes of digital transformation (Vial, 2019; Sjödin et al., 2018). AI maturity was closely related with three enablers (management readiness, data maturity, and entrepreneurial attitude). Complementary adopters ranked higher in all three dimensions consistently. They had leaders who cared about strategic AI, were better equipped to work with data systems to better leverage them, and had more entrepreneurial cultures in place—supporting the influence of leadership, data infrastructure, and digital entrepreneurialism on successful transformation (Sousa & Rocha, 2019; McAfee & Brynjolfsson, 2012; Kraus et al., 2021). Clustering showed that these enablers intersected to create a mutually reinforcing capability bundle facilitating strategic, knowledge-intensive AI applications (Corres, 2017), consistent with RBV and dynamic capabilities theory.

4.1 Limitations and Further Research

The small tech-focused cohort (n = 20) restricts generalization, and managers' self-assessments may be bias-inducing. Bigger and more representative samples, long-term studies of AI maturity development, objective measures of performance, and an analysis of regulatory and ecosystem factors driving the transition from automation to knowledge intelligence will all be welcome in future research.

5. CONCLUSION

In conclusion, the results demonstrated that AI's contributions to SMEs went from a purely operational efficiency-driven path to a knowledge-intelligent, strategic resource role, but only for enterprises that built managerial readiness, data maturity, and an entrepreneurial mindset. This paper examined the strategic role of AI in SMEs, ranging from automation to advanced knowledge intelligence in terms of capabilities, decision support, and customer value. Using 20 technology-oriented SMEs, we discovered two adoption stages (early and complementary) influenced by managerial preparation, data maturity, and entrepreneurial mentality. The majority of SMEs continue to employ AI as an efficiency tool, but more advanced businesses are deploying AI as a knowledge enabler for learning, competence development, and innovation.

We can conclude that complementary adopters were consistently more leader-ready and/or had better data systems and/or were more entrepreneurial—explaining why some SMEs advance beyond automation and others continue to seek efficiency. Here, we suggest a three-phase AI maturity model for SMEs. Phase 1 – Automation: Limited-scope, siloed projects; rudimentary data; AI is understood to be the efficiency instrument. Phase 2 – Data Intelligence: Improved data quality and integration; AI to drive decisions, customer value, and service innovation. Phase 3 – Knowledge Intelligence: AI embedded in learning and strategy; firms build capabilities for continuous data-driven improvement, innovative activities, and unique value creation.

Future research should have a more strategic roadmap for SMEs that covers setting up reliable data platforms, improving data quality, basic governance, and setting up AI use cases to help the business grow. Building AI-ready leadership and culture—educating managers, getting projects working with KPIs, and supporting experimentation. With the end goal to scale AI—embed successful pilots, develop internal or hybrid abilities, and have AI used toward decision support and innovation.

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THE RIGHT TO INTERNET ACCESS AS A UNIVERSAL HUMAN RIGHT

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Abstract: In the era of digital transformation, internet access is no longer merely a technical issue but a question of human rights, equality, and social inclusion. The Internet today forms the foundation for access to education, healthcare, employment, political participation, and information. Global digital inequality has become a serious challenge, as millions of people worldwide still lack stable, secure, and free internet access. This raises a key question: should the right to internet access be recognized as a universal human right, and if so, how can it be implemented and protected in practice? The motivation for this research stems from the urgency of addressing the growing social disparities deepened by the digital divide. This issue gained even more relevance during crises such as the COVID-19 pandemic, when the lack of internet access and digital literacy led to mass exclusion from education and social life. Using a combined methodological approach, the study identifies several emerging challenges: unequal access to digital resources, unclear privacy boundaries, insufficient legal protection of digital users, and ethical dilemmas related to artificial intelligence and data processing. Through comparative analysis of relevant legal frameworks across countries and the examination of international standards such as data protection regulations and cybersecurity laws, this research explores both the legal and social dimensions of digital exclusion. The goal is to examine the problem through legal, social, infrastructural, and ethical perspectives to develop a comprehensive understanding of the possibilities and limitations of formalizing the right to internet access. The results show that the international community is increasingly aware of the importance of digital access, yet legal recognition of internet access as a human right is still not universally accepted. In 2016, the United Nations adopted a resolution condemning deliberate internet shutdowns, but it remains non-binding. Even in countries that have recognized this right, implementation remains problematic due to the lack of operational mechanisms. Furthermore, risks persist — states that guarantee internet access may simultaneously apply censorship, mass surveillance, or digital control. Ensuring access does not automatically mean ensuring freedom or safety in the digital space. Although international law does not explicitly recognize internet access as a human right, it increasingly acknowledges it as a means to realize other fundamental rights. Potential solutions include recognizing internet access as a basic right at national and international levels, establishing public policies to subsidize access for vulnerable groups, investing in digital literacy and infrastructure, and developing independent monitoring of digital exclusion as a form of social discrimination.

Keywords: *digital rights, human rights, internet access, social inclusion, digital divide.*

Field of the paper: Social sciences

1. INTRODUCTION

The internet is increasingly becoming an indispensable tool for the protection of human rights. The rapid digitalization of contemporary societies transforms the internet into an essential medium for communication, education, economic participation, and access to public services. Internet connectivity now functions as a basic prerequisite for engaging in daily social and professional activities, and its absence significantly limits the ability of individuals to access information, opportunities, and essential resources. The persistence of the digital divide, understood as the unequal distribution of reliable and affordable internet access, creates substantial barriers to social inclusion and human development. These disparities are increasingly visible in sectors such as education, healthcare, employment, and governance, where digital platforms become the primary channels for interaction and service delivery.

In this context, the question of whether internet access constitutes a human right becomes a central issue for contemporary policy and academic debate. Human rights frameworks evolve alongside technological and social change, and current conditions demonstrate that many fundamental rights — such as freedom of expression, access to information, and participation in public life — depend on meaningful internet access for their practical realization. Although core human rights documents do not explicitly mention digital connectivity, the modern interpretation of these rights increasingly assumes an environment where internet access is available and functional. As societies become more interconnected and digitally dependent, the exclusion of individuals from online spaces raises ethical and legal concerns related to equality, autonomy, and democratic participation. The objective of this study is to examine whether internet access should be recognized as a human right within the contemporary global environment.

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2. MATERIALS AND METHODS

This study used a structured multi-method research. The approach combined comparative legal analysis, international document analysis, and secondary data assessment. All materials consisted of publicly available legal texts, global policy documents, and international statistical datasets.

The first methodological step involved a comparative legal analysis of national frameworks that formally recognize digital access rights. Three key sources were selected based on their relevance and legal significance: Finland's Communications Market Act, Costa Rica's Constitutional Chamber ruling No. 2010-12790, and Article 5A of the Greek Constitution. These documents were reviewed through standard legal-interpretation techniques, including textual examination and comparison of implementation mechanisms.

The second step applied document analysis to major international digital-rights frameworks. The following documents were included: United Nations Human Rights Council resolutions on internet access, the General Data Protection Regulation (GDPR), and International Telecommunication Union (ITU) global connectivity reports. Each document was coded for references to digital access, rights protections, and state obligations.

The third step consisted of secondary data analysis focusing on global digital-inequality indicators. Data were obtained from the ITU and the World Bank. Variables reviewed included household internet access, broadband affordability, and infrastructure distribution. Descriptive analysis was used to identify major global trends and disparities. Additionally, an ethical assessment was conducted using established principles of autonomy, privacy, and fairness to evaluate risks related to surveillance, algorithmic decision-making, and corporate digital power. Together, these methods produced a replicable and coherent foundation for evaluating the legal, social, and ethical dimensions of recognizing internet access as a human right.

3. RESULTS

The findings of this study indicated several significant outcomes regarding the recognition of internet access as a human right and the broader conditions necessary for meaningful digital inclusion. The comparative legal analysis showed that the formal acknowledgment of digital access rights was both feasible and increasingly present in national legislative and constitutional frameworks. Finland's broadband legislation demonstrated that governments could legally guarantee minimum internet speeds and impose universal-service obligations on providers. Costa Rica's constitutional interpretation confirmed that courts were capable of expanding existing human-rights protections to include digital communication. Greece's constitutional provision further illustrated a proactive approach, embedding participation in the information society directly into the country's legal foundation.

The examination of international governance frameworks revealed a growing global convergence toward the recognition of digital connectivity as a prerequisite for the exercise of fundamental human rights. United Nations resolutions emphasized that online freedom of expression, access to information, and participation in public life depended on reliable and affordable connectivity. Analysis of ITU statistical data showed that approximately three billion people remained offline, with the highest levels of exclusion occurring in low-income regions, rural areas, and marginalized communities. This exclusion was strongly associated with income levels, gender disparities, educational inequalities, and infrastructural deficits.

The results also indicated that even in countries with high connectivity rates, significant barriers continued to limit meaningful digital participation. Affordability emerged as a persistent constraint, particularly for low-income households unable to sustain monthly broadband costs. In addition, gaps in digital literacy reduced the capacity of individuals to use the internet for education, employment, civic engagement, or public-service access. These structural inequalities reflected not only technological limitations but also broader socioeconomic divides that reinforced existing patterns of exclusion.

Data protection and privacy concerns were also identified as major obstacles to the effective exercise of digital rights. The findings showed that widespread surveillance practices—conducted by both governments and private technology companies—significantly reduced public trust in digital platforms. Instances of data exploitation, opaque terms of service, and insufficient oversight mechanisms undermined users' ability to participate safely and autonomously in the digital environment. The analysis further demonstrated that AI-driven systems frequently reproduced social biases due to flawed or incomplete training data. These algorithms influenced online information access, content moderation, employment screening, and public-service delivery, often without transparency or accountability.

Finally, the results indicated that universal connectivity alone was insufficient to guarantee

equitable digital participation. The study showed that effective digital inclusion required a combination of legal protections, robust governance frameworks, ethical safeguards, and investments in digital skills. Without these complementary conditions, internet access risked becoming a superficial metric rather than a substantive human right. The findings collectively demonstrated that recognizing internet access as a human right was not only justified but also necessary for addressing emerging global inequalities in an increasingly digital society.

4. DISCUSSIONS

The results of this study contributed to ongoing debates regarding the status of internet access within contemporary human rights frameworks and contexts. The findings supported the view that digital connectivity has become an essential precondition for exercising numerous civil, political, social, and economic rights. This shift indicated that internet access is no longer merely an enabling tool but a structural condition for participating in modern society. By demonstrating that several states have already incorporated digital access guarantees into their legal systems, the study provided evidence that such recognition is both feasible and increasingly necessary. These insights fit into the broader understanding that human rights must evolve in response to technological and social transformation.

The significance of these findings lies in their implications for global equality and democratic participation. Recognizing internet access as a human right would establish clear obligations for states to ensure nondiscriminatory, affordable, and reliable connectivity. Such recognition would also strengthen accountability mechanisms by requiring governments to address digital exclusion as a rights-based issue rather than a purely economic or infrastructural challenge. The study's results therefore contribute to a growing consensus that universal digital inclusion is essential for safeguarding human dignity in the digital age.

At the same time, the discussion revealed major challenges that complicate the practical realization of digital rights. Infrastructure limitations, particularly in underserved and economically disadvantaged regions, continue to hinder widespread access. These gaps suggest that market-based models alone cannot deliver comprehensive coverage, and that public investment, regulatory oversight, and state responsibility remain indispensable. Ethical risks associated with data extraction, mass surveillance, and algorithmic bias further highlight that connectivity without adequate protections can expose individuals to new forms of vulnerability. These issues emphasize that digital inclusion must be accompanied by robust governance frameworks that protect autonomy, privacy, and fairness.

Expanding beyond the immediate findings, the study underscored that meaningful digital participation depends on several interdependent conditions. Connectivity must be paired with digital literacy, transparent platform governance, equitable technological design, and mechanisms that prevent discrimination in algorithmic systems. Without these elements, access may increase, yet inequality and social exclusion may simultaneously intensify. The broader implication is that internet access should be conceptualized not merely as technical availability but as a multidimensional right that interacts with political processes, economic structures, and ethical norms.

In conclusion, the results of this study reinforce the argument that recognizing internet access as a human right is both justified and increasingly unavoidable. Such recognition has the potential to promote greater social equity, strengthen democratic engagement, and ensure that technological progress supports rather than undermines human dignity.

5. CONCLUSIONS

The findings of this study demonstrated that recognizing internet access as a universal human right is both necessary and achievable within contemporary legal and institutional frameworks. The results indicated that digital connectivity has become essential for exercising a wide range of fundamental rights, and that exclusion from the digital environment increasingly leads to exclusion from education, employment, healthcare, and civic participation. This research therefore underscored that digital inequality is not merely a technological issue but a structural driver of broader social and economic disparities.

The implications of these findings point to the need for a transition from non-binding policy recommendations to enforceable legal guarantees. Ensuring universal and meaningful internet access will require coordinated infrastructure investment, effective regulation of telecommunications markets, and comprehensive digital literacy initiatives that enable individuals to benefit fully from online opportunities. In addition, the protection of digital rights must include strong safeguards for privacy, transparency in algorithmic systems, and limitations on excessive surveillance practices. The most authoritative global

guidance comes from the Human Rights Council, which emphasizes that states should take all necessary measures to guarantee individuals' access to the internet. A comparable position has been adopted by the European Parliament, reaffirming the importance of universal and secure online connectivity.

In summary, the study concluded that internet access should be understood as both a critical technical resource and a fundamental prerequisite for human development and equality. Establishing universal digital inclusion is essential for creating democratic, equitable, and rights-respecting societies in an era defined by rapid technological change.

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THE IMPLEMENTATION OF ARTIFICIAL INTELLIGENCE IN THE EDUCATIONAL INSTITUTIONS: EVIDENCE FROM SERBIA

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Abstract: In the knowledge society and knowledge-based economy, artificial intelligence is gaining an increasingly important role and significance. Research shows that artificial intelligence will have a main influence on the global economy through increasing labor productivity through the automation of activities, which will lead to changes in education, health care, public sector services, etc. At the same time, the accelerated development and application of artificial intelligence is causing increasing concern about possible abuses. Therefore, at the global but also at national levels, various initiatives have been launched in order to regulate questions regarding to the development and practical application of AI.

The Republic of Serbia also joined these initiatives by adopting “the Strategy for the Development of Artificial Intelligence in the Republic of Serbia for the period 2025-2030” as well as the previous Strategy for the period 2020-2025. In addition to normative and institutional regulation, activities aimed at promoting and raising citizens’ awareness of the importance of artificial intelligence in order to encourage the inclusion of population in the process of development and improvement of society are also of particular importance.

Starting from these facts, the paper analyzes the state and possibilities of using artificial intelligence in the educational institutions in Serbia. In order to determine the level of awareness of Serbian students about artificial intelligence and the perspectives of its application, an original empirical research was conducted in schools in the territory of Serbia. A total of 2.213 students participated in the survey, of which 1.512 were respondents from primary schools and 701 from secondary schools in Serbia. In addition to descriptive statistics and the technique of a structured questionnaire, the appropriate qualitative methodology was applied in this research too.

Based on the research results and their interpretation, the authors came to the conclusion that there exists a significant potential for a further implementation of AI in the educational institutions in Serbia, as well as that current practical teaching is poorly developed.

Keywords: Artificial intelligence (AI), education, educational institutions, primary school, secondary school, students, AI awareness.

Field: Social sciences - Economics.

1. INTRODUCTION

Artificial intelligence (AI) is becoming a key technology shaping the modern world with applications in numerous fields, primarily in medicine, industry, education, agriculture, public sector. The ability of AI to analyze large amounts of data and make quick decisions significantly improves production and business processes, thereby reducing costs and raising the quality of life.

For example, in healthcare, AI is bringing great advances in diagnosis and therapy, while in education, it enables personalized learning that is accessible to a wider range of people and helps everyone progress more easily than before. In many sectors, this technology shows the ability to transform existing work models and contribute to sustainable development.

However, in addition to significant advantages and benefits, AI also opens up a number of challenges that require careful elaboration. Ethical issues such as privacy protection, bias in algorithms and potential abuses are becoming increasingly important. In addition, there is a risk that AI-driven automation will increase inequalities, especially in less developed economies where many jobs are at risk. The lack of clear regulations in numerous countries further complicates the situation, as it enables the uncontrolled application of technology. Also, there is the issue of energy efficiency because the development and application of artificial intelligence require a large amount of energy.

In order for artificial intelligence to realize its full potential, it is necessary to solve these challenges

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at the level of countries, but also through cooperation at the global level. Proper regulation, investment in education and technology, and an ethical approach to development can ensure that AI is beneficial for all. Only through a balanced use of this technology can we ensure that it serves humanity, instead of becoming a source of new problems and inequalities.

An important event for the development of AI is related to the ChatGPT application that uses a large language model to generate text and through integration with multimedia generative models of other content. The application became generally available from November 2022 and very quickly found its wide use in everyday business and other activities. Intellectual property rights, business application and method of use in education are the most important issues brought about by the accelerated development of artificial intelligence.

Research shows that artificial intelligence will have a main influence on the global economy through increasing labor productivity through the automation of activities, which will lead to changes in education, health care, public sector services, etc. At the same time, the accelerated development and application of artificial intelligence is causing increasing concern about possible abuses. Therefore, at the global but also at national levels, various initiatives have been launched in order to regulate issues related to the development and practical application of artificial intelligence, from non-binding recommendations to legal solutions.

Numerous documents were adopted as a result of established international agreements and initiatives. In the United Kingdom, the "Bletchley Declaration" was adopted, where 28 countries agreed that artificial intelligence should be developed and applied in a safe, reliable and responsible way, adapted to humans. The United Nations adopted "the Global Resolution on safe, secure and trustworthy artificial intelligence systems for sustainable development". G7 members launched the so-called The Hiroshima Process aims to shape the global governance of advanced artificial intelligence systems, particularly generative artificial intelligence technologies. This process aims to ensure that artificial intelligence is developed in a way that is safe, reliable, legal and in line with the values of humanity. On March 13, 2024, the Parliament of the European Union adopted "The Artificial Intelligence Act", which uniquely regulates AI field - questions and concerns related to the development and implementation of AI. According to this law: "An artificial intelligence system is a machine-based system that, due to explicit or implicit goals, derives from the input it receives a way to generate outputs such as predictions, content, recommendations or decisions, which can affect physical or virtual reality". (Strategy, 2025)

In addition to these national and interstate documents, many companies are making their own rules regarding how to develop and implement AI to ensure safety, security, and good and responsible use of artificial intelligence.

2. LITERATURE REVIEW

The application of different paradigms and techniques such as machine learning, deep learning, neural networks and the like, has made it possible to use machines in such a way that they can process large amounts of different data, taking into account the changes that are happening at a given moment and form answers or proposals based on this, or make conclusions and predictions that seem as if they were designed by humans. Today, we call such an ability of machines "artificial intelligence".

If some political and economic incentives "remain the primary drivers of the development of AI and other digital technologies, as Ionescu (2024) notices, the digital gap between high- and low-income countries will drive a stark disparity in the distribution of related benefits – and risks".

As authors point out "the phrase "artificial intelligence" is a generic one that may be used to describe any variety of computer software that participates in tasks that are analogous to those performed by humans, such as learning, planning, and problem-solving. To refer to certain applications as "artificial intelligence" is like to referring to a car as a "vehicle"; while this is technically accurate, it does not encompass any of the nuances of the topic". (Bharadiya et al.; 2023). "The applications of Artificial Intelligence range from detecting trends in data to mitigate market risks, enhancing customer service through virtual personal assistants, or even analyzing millions of documents across a company's servers to find compliance failures. But it is only recently that companies have been able to anticipate and envision the possibilities that Artificial Intelligence and robotics can bring to the future of the business world". (Palanivelu, Vasanthi, 2020).

One of the definitions of artificial intelligence was proposed in November 2023 by the OECD: "An artificial intelligence system is a machine-based system that, based on explicit or implicit goals, draws conclusions from received data, in order to generate output information such as predictions, content, recommendations or decisions that can affect the physical or virtual environment". (OECD, 2023).

The rapid advancements in science and technology worldwide are bringing about significant transformations in many facets of life, including education. Addressing AI-related anxiety is crucial for fostering an inclusive and supportive learning environment. Students experiencing anxiety or fear about AI may exhibit hesitancy toward engaging with technology-driven educational tools or innovative learning approaches (Source: Cantaş, et al., 2024). "The application of AI in educational institutions is important because its implementation represents a reengineering of traditional teaching methods and improves the overall learning ecosystem. The author Karamanu and Goksuu (2024), emphasized that the combination of AI and catboats is important because it has led to extreme changes in the education sector, adopting a large number of applications that have been successfully implemented" (Tešić, Pavlović, 2025). The emergence of artificial intelligence (AI) influences almost every facet of education and is also accepted and valued by educators. The regular use of AI in education can be considered one of the most decisive developments of the century (Source: Julien, 2024).

Karakose (2024) emphasis that "one of the hot discussions over the exponential advancement of AI has been whether this ability of machines to accomplish tasks that require human intelligence could take over the roles of humans in the workplace and make the human workforce redundant. The field of education was no exception since AI technologies have made significant inroads into the realm of education". While the authors (Luan et al., 2020) indicate that "through gathering, analyzing, and assessing large datasets, AI-based big data analysis can extract 'actionable knowledge and viable patterns from data' by employing 'a variety of technologies and tools, such as statistical analysis, data mining, data visualization, text analytics, social network analysis, signal processing, and machine learning".

3. MATERIALS AND METHODS

The Republic of Serbia has realized the role of artificial intelligence in achieving socio-economic development, which is why it has joined efforts for normative regulation of this area. Namely, 10.01.2025 the Government adopted "the Strategy for the Development of Artificial Intelligence in the Republic of Serbia for the period 2025-2030" in which "the Strategy for the Development of Artificial Intelligence in the Republic of Serbia for the period from 2020-2025" ceased to be valid. "The strategy lays the foundation for the further development of the legal and institutional framework that will enable the creation of solutions for numerous ethical and regulatory challenges. This approach creates prerequisites for preventing potential abuses of artificial intelligence and ensures compliance with the ethical standards that the Republic of Serbia strives for" (Strategy, 2025, p. 2). AI is an integral part of the education process, which is also recognized in this strategy. The development of language technologies can influence that educational contents created in other languages can now be translated into Serbian much more easily and thus applied in education. In this way, the repository of tools for use in education is increased. "The Center for Robotics and AI in Education" was established within the University of Belgrade, which is a significant step in the direction of improvement and development and application of artificial intelligence in education.

In the past period, following the trends of education development in accordance with the current Artificial Intelligence Strategy, two subjects were introduced in primary and three optional subjects in secondary schools where artificial intelligence is studied. Thanks to this, the Republic of Serbia was recognized by the UNESCO as one of the 11 countries that introduced artificial intelligence at the national level in the K-12 education system.

In the part of higher education, study programs have been established that fully or largely fit into the basic curriculum, which provides undergraduate students with the knowledge and skills needed for postgraduate studies in the field of artificial intelligence. Seven master's programs in this field have been established at six faculties, and 133 students have enrolled so far. These programs are designed to follow the needs of the economy. According to the data presented in the Strategy, 600 participants went through special training programs in the field of artificial intelligence implemented by the National Academy for Public Administration. The implementation of the training "Application of ethical guidelines in the development, implementation and application of reliable and responsible artificial intelligence" is planned.

In the third quarter of 2024, the Republic of Serbia became the first non-EU country to host the prestigious Eastern European School of Machine Learning. More than 200 researchers and engineers from 47 countries attended the school. The activities of science and technology parks in Belgrade, Novi Sad, Nis and Cacak, which gather startups and innovative companies, and which at the end of 2023 had more than 250 member companies, including research and development centers of global companies with a significant number of employees, also contributed to the greater influence of the Strategy in the field of further development of the economy based on artificial intelligence.

In addition to normative and institutional regulation, activities aimed at promoting and raising citizens' awareness of the importance of artificial intelligence in order to encourage the inclusion of population in the process of development and improvement of society are also of special importance. One of the basic goals of this Strategy is "to improve primary, secondary and higher education in the field of artificial intelligence and create conditions for educating the entire population about the possibilities, limitations and risks of the AI technology".

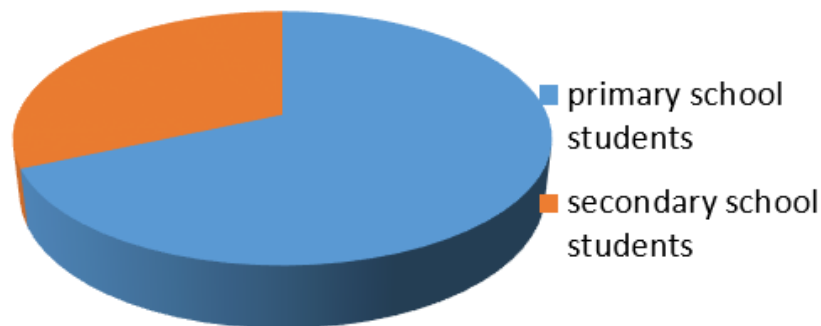
In order to determine the level of awareness of Serbian students about artificial intelligence and the perspectives of its application, an original empirical research was conducted in schools in the territory of Serbia. The research was conducted by the Center for Teaching Improvement "Abacus" from Belgrade. In addition to descriptive statistics and the technique of a structured questionnaire, the appropriate qualitative methodology was applied in this research too.

4. RESULTS AND DISCUSSIONS

A total of 2.213 students participated in this survey; 1.512 respondents from primary schools and 701 from secondary schools in Serbia.

Some of the summarized results of this research based on a survey conducted through a structured questionnaire on a sample of 2.213 respondents – students from Serbian primary and secondary schools from are presented in following figure and charts as well as explanations.

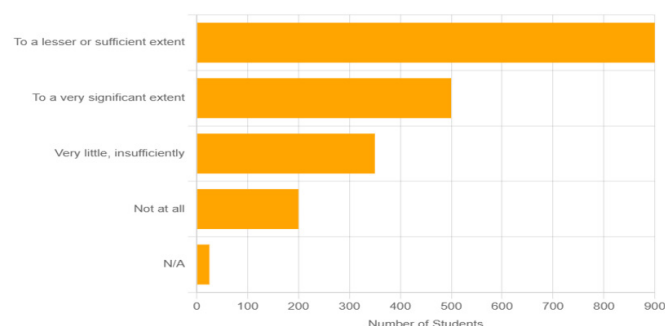
Figure 1 Students from primary and secondary schools in Serbia



Source: Authors calculation based on the survey data

As can be seen in Chart 1, 53% of students were familiar with AI "to a lesser but sufficient extent". 26% of students stated that they were familiar with it "to a very significant extent" while more than 10% of students had no contact with this topic at all. Based on the data obtained from the respondents, it can be stated that more than three-quarters of students have at least some level of familiarity with AI, which indicates its widespread presence in education.

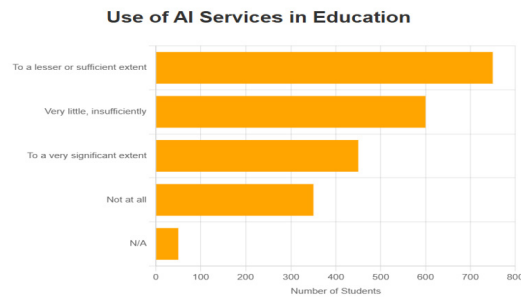
Chart 1 Familiarity with AI



Source: Authors calculation based on the survey data

When it comes to the using AI for educational purposes, more than half of students actively use AI tools in school activities. Precisely 36% of students use AI "to a lesser but sufficient extent", 22% used AI "to a very significant extent". 21% did not use AI at all.

Chart 2 Use of AI services in education

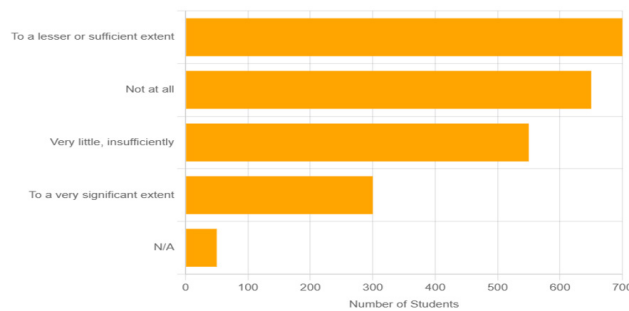


Source: Authors calculation based on the survey data

To the question about practical examples and application of AI at school - the results were obtained which show that only 15% of students had practical examples “to a very significant extent” and 30% of students had no contact with practical application at all.

Chart 3 practical application of Ai in education

Practical Application of AI in Education

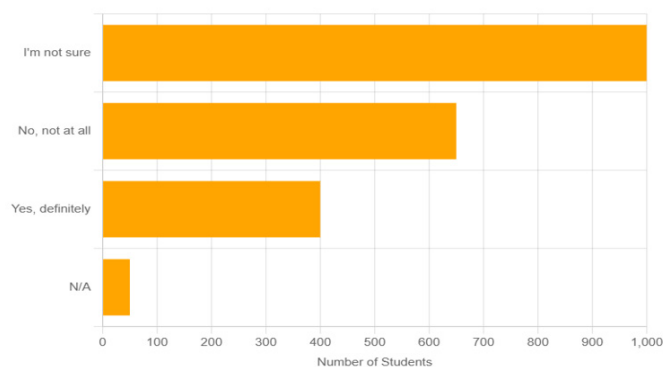


Source: Authors calculation based on the survey data

Are you better student because of AI? To this question most students (about 50%) are unsure about the impact of AI on success. 23% believes that they are “definitely” better students because of it.

Chart 4 Impact of AI on Academic Success

Impact of AI on Academic Success

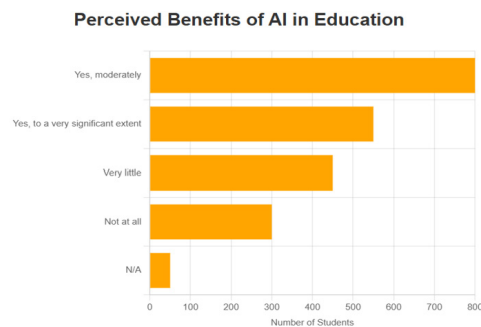


Source: Authors calculation based on the survey data

AI is perceived as a useful tool in the learning process by most students. There is some potential, but there is a lack of systematic education that would consolidate the belief in the benefits of AI.

To the question Does AI help in schooling - 40% of students believe that AI helps them “moderately” while 27% say that AI helps “to a very significant extent”.

Chart 5 Perceived benefits of AI in education



Source: Authors calculation based on the survey data

According to the results present in the Chart 5, AI is perceived as a useful tool in the learning process by most students. There is some potential, but there is a lack of systematic education that would consolidate the belief in the benefits of AI.

5. CONCLUSIONS

The area of artificial intelligence is undoubtedly very interesting and significant today. When it comes to the implementation of AI in the educational institutions, some predictions show that in the times ahead, knowledge from this field will be necessary in all spheres of the educational system. According to the some predictions, more than 90% of the primary and secondary schools students will use AI during the school year by 2027. At the same time, automation will not replace learning; nevertheless it will enhance it.

Based on the results of the original empirical research, parts of which are presented in this scientific paper, it can be concluded that over 75% of Serbian students are familiar with artificial intelligence (AI), but only 15% had hands-on experience with AI in class. Also, more than half of respondents use AI independently for their studies. One of main findings of this original scientific research is that students from Serbian primary and secondary schools who participated in this research perceive AI as helpful, but not a magical solution too.

In comparison with other research such as PISA 2022 by which only 23% of students in Serbia regularly use ICT in education, results which were presented in this paper confirms great potential of AI use in Serbian educational institution. But also confirms a lack of institutional support. Therefore, it is necessary that decision-makers in the Republic of Serbia provide concrete institutional support in the coming period that will contribute to better student results in the Serbian education system regarding the sustainable use of AI in the entire learning and education process.

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DIGITAL LANGUAGE LEARNING

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Abstract: With the advent of technology and the advancing digital age, SLA has witnessed a profound transformation providing learners with an extensive range of tools and resources. The article describes the shift from traditional to digital learning and discusses the benefits and challenges associated with incorporating digital tools and technologies into a language learning environment. It aims to delve into the extensive research on digitalization in the context of SLA and focuses on the impact of the digital age on learning a second language exploring L2 participation in digital forms and practices. The object of the study are the approaches to FLT and the way they can be used synchronically with contemporary technology as well as the way technology use upgrades and fosters foreign language acquisition. Embracing technology in language learning enhances accessibility, flexibility, interactivity, and personalization benefiting learners from various backgrounds. Digital platforms provide interactive exercises, gamified quizzes, and real-time feedback allowing learners to practice in a dynamic and engaging manner. Such tools promote self-directed learning supporting learners in second language acquisition. Balancing technology integration with traditional teaching methods is essential to foster comprehensive language development.

Keywords: *digital learning, digital competence, digital literacy.*

Field: Humanities

1. INTRODUCTION

The digital era has revolutionized various aspects of life including language acquisition. With the advent of technology and the advancing digital age, second language acquisition has witnessed a profound transformation providing learners with an extensive range of tools and resources. Researchers have begun exploring the benefits and challenges associated with incorporating digital tools and technologies into language learning environments. This article aims to delve into the extensive research conducted on digitalization in second language acquisition. It focuses on the impact of the digital age on learning a second language exploring the opportunities and the challenges it poses.

The object of the study are the approaches to foreign language teaching and the way they are used synchronically with contemporary technology as well as the way technology use upgrades and fosters foreign language acquisition. The study focuses on second language acquisition but in search for new ways to complement the traditional approaches in order to get more effective learning. The research questions are

- How can learners develop digital competence and create a direct link between learning resources and styles and their achievement?
- How can learners use digital technologies in second language learning?

Although people still debate on the benefits of the Internet nowadays, linguists are increasingly studying its influence on language. A lot of researchers in the field (see Chapelle and Sauro 2017, White 2017) study the technology-instruction interference on language learning including language skills, vocabulary and grammar, pragmatics and intercultural learning.

2. UNDERSTANDING THE SHIFT FROM TRADITIONAL TO DIGITAL LEARNING

The key word that distinguishes the research from the traditional learning and experiences in the classroom is 'digital'. Starting with the digital environment, Kotsanis (2018, 29) defines it as "a context, or a place, that is enabled by technology and digital devices, often transmitted over the Internet, or other digital means". Since digital technologies are fundamentally transforming economy and social life and, at the same time, are reshaping the educational system, teachers are to preparing learners for the digital world. Technology is allowing learners to experience simulated real-life scenarios and practice their language skills because language learning websites offer extensive libraries of audio and video resources that enhance listening and speaking skills. Platforms, on the other hand, provide multimedia content suitable for learners of different proficiency levels.

Digitalization is revealed as a process of connecting people, access to new knowledge and education, on the one hand, and a transition from one's competences to the opportunities of technology,

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on the other hand. The formation of digital competence is of significant importance. Digitalization has made it easier for learners to access a vast array of online language learning resources, such as interactive exercises, multimedia materials, and online dictionaries. Learners can now conveniently access these resources at any time and from anywhere, allowing for independent and self-paced learning.

Digital competence is a key factor in the digitalization of education – knowledge about what and how you can use for effective learning. The article defines and integrates digital competence as necessary in today's world of industrial revolution and refers to its prior importance as an ability to use digital technologies effectively and responsibly in various contexts, including language learning. Thus, digital competence consists of three main learning domains: knowledge, skills, and attitudes. Knowledge (cognitive domain) consists of facts, theories, and principles through learning. Skills (psychomotor domain) are the ability to manage tasks or problem in practice and attitudes (affective domain) represent ways of thinking about potential solutions into one's idea or plan.

In the contemporary world with the dynamic and creative use of ICT in the classroom, teachers can communicate and collaborate as well as prepare and share materials effectively.

“Digital competence implies connectivity with the skills to use digital technologies that allow teaching professionals to work with modern information and communication technology, computers, software applications and databases, helping them to realize their ideas and objectives in the context of their work. It is important for education majors to have the ability to search, collect and process information and approach it critically and systematically as well as the skills to use the design tools for media information and the capacity to access, search and use Internet-based services, especially in the context of their future activities and opportunities for continuous professional qualification.” (Tsankov & Damyanov 2017, 204).

There are five main areas which overlap because some of the activities cannot be isolated. Each of these areas are further divided into competences.

Information and data literacy to search and manage the information. Information is related to four competences, which follow the principle SSS+C. Search is the ability to find digital resources and sort the irrelevant information while storage is the ability to organise and store digital material safely. The benefit from self-service solutions online and critical evaluation of digital information are also part of this main area. Communication and collaboration imply the ability to interact and participate in virtual teams and share the information. Active participation and collaboration, social awareness and media choice are the competences in the area of communication. Digital content production is the ability to use technology to create and copyright. The area consists of production and sharing together with digital exploration of new digital opportunities. Safety of personal data, health and environment and attention to legal rights. In this context safety is related to knowledge about laws and licenses for digital behavior. Problem solving to identify and solve technical problems.

Digital competence and digital literacy are two terms that are closely interrelated. While digital competence expresses the skills necessary in the digital age, digital literacy is described as the ability to manage and integrate information, technology, and media (Paynton 2012).

Figure 1. Meaning of 'digital literacy'



Source: How to develop digital literacy skills <https://zorgle.co.uk/how-to-develop-digital-literacy-skills/>

‘Digital literacy’ was introduced by Gilster (1997, 1) as “the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers”. Digital literacy originates together with ‘media literacy’ and ‘computer literacy’ as a concept and relates to the functional use of technology and skills. Digital literacy means having the skills you need in the contemporary world where communication and access to information is established through digital technologies.

3. BENEFITS OF DIGITAL LANGUAGE LEARNING

Nowadays technology can inspire and motivate learners to practise their language skills, collaborate and work creatively.

The digital age has ushered in several advantages for second language acquisition:

1. Accessibility – digitalization enables learners to access a variety of resources and authentic materials, such as videos, podcasts, and articles, enhancing their exposure to real-life language usage.

2. Flexibility – digital materials can be used any time from anywhere making it convenient for individuals with busy schedules. An advantage of learning online is that the lesson can be recorded. There are four approaches, which demonstrate that flexibility as a characteristic feature of learning in the digital environment fosters self-direction, motivation, and engagement.

Online collaborative learning is an approach which gives students the opportunity to learn through online discussions. The instructor is a facilitator who encourages collaborative problem-solving while students brainstorm, compare, analyze and synthesize their ideas in a collaborative group context. Using discussions to drive interest and engagement is an important learning strategy.

Connectivism is an approach that is based on forming connections between previous knowledge and new knowledge. It relies on students to be aware of the gaps in their knowledge and address them. This is an independent self-motivating learning style because students connect knowledge and ideas, seek understanding via the internet or other resources and connect and share knowledge with other students via technology.

Cybergogy is an approach that helps students learn effectively in a digital environment (Wang et al. 2006). Learners construct and internalize knowledge, then sustain it through a social process. In this approach knowledge and social interaction are inseparable and lead to enhanced collaboration and increased learning outcomes.

Heutagogy is another self-directed learning approach but it gives students the chance to determine what they learn. Studies are pursued due to interest and needs. The educator is more of a coach and encourages students to pursue and excel in topics they are passionate about.

3. Interactivity – digital language learning provides opportunities for learners to practise their communication skills. Interactive digital tools, language learning apps and platforms increase learners' engagement in the lesson.

Teacher can work with the whole class or can send students to different breakout rooms quickly and easily; the significant point is that she should organize well how long the activities will be and transitions will take as well as how she is going to interact with and give feedback to students.

4. Personalization – online platforms incorporate learning technologies that adapt to individual learner preferences and tailor lessons to the learners' needs catering to different proficiency levels and learning styles providing immediate feedback on exercises and assessments. Adaptive learning algorithms analyze learners' progress and provide customized feedback for improvement. Digital tools provide the opportunity for individualized learning experiences, allowing learners to focus on their specific language needs and progress at their own pace.

4. DIGITAL PEDAGOGY

Teachers face the challenge of refining teaching and learning techniques to keep up with the increasing demands of students. Nowadays students make the transition between their real and digital lives using technology. Digital pedagogy is the teachers' attempt to change the teaching and learning experiences of students through the use of technology.

The question that arises is Why do we need a digital pedagogy?

The answer derives from the challenges of the modern world and it is for social and pedagogical imperatives. This approach complements previous educational approaches from the field of communication and media science. After the emergence of the global digital network, it has become a vital part of the learning process. Nowadays teachers can take their lectures apart, turn content into assignments and self-study units and find ways to facilitate group work and communicate with students. Upon reflection, compared to the face-to-face groups, teachers seem to have much closer connections to the technology group because students tended to contact teachers very often and started to share the joy and the fun and the obstacles they met, the boredom they felt. But technology enables authentic conversations and this is an advantage.

Teachers have four roles in the age of technology – lecturers, passing knowledge, concepts, and theories, explaining and thinking critically; trainers when students apply these theories into practical

examples; facilitators when help students repeat and drill skills, through directing their discussions, and personal coaches in that teachers look where students stand and what they need in their personalized learning. Technology assists in that. Teachers can video record the lesson and put it online. They can offer gaming simulations to create drill exercises. Thus, technology can and will totally disrupt the teaching pattern. Teachers have become less lecturers but more of facilitators.

Teaching methods can vary according to different criteria such as objectives, subject area, philosophy, and classroom demographics (Psoinos 2021). These include PPTs, online whiteboard, live online classes, pre-recorded videos, flipped classroom, game-based teaching, and class blog.

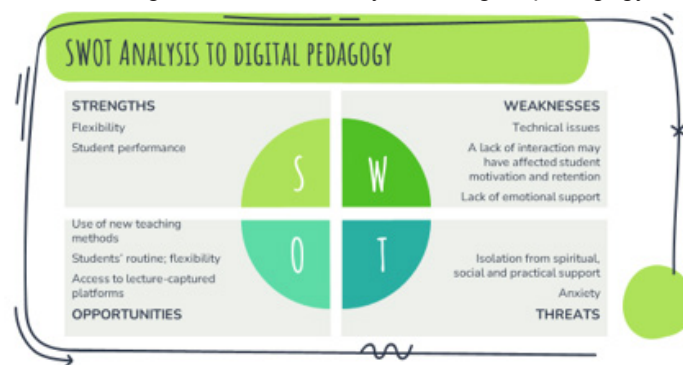
Virtual classrooms and video conferencing tools have facilitated online language lessons connecting teachers and learners beyond geographical boundaries. This increased access can significantly enhance learners' motivation by offering engaging and personalized learning experiences.

Online assessment tools enable teachers to evaluate learners' progress effectively and provide feedback.

Language learning applications offer gamified learning experiences motivating learners to acquire language skills through interactive challenges and rewards.

Successful digital learning can be achieved when learners actively participate in online language communities and forums. For this reason, diverse digital platforms should be utilized to maximize exposure to the target language and multimedia resources should be employed to develop all language skills (listening, speaking, reading, and writing). Besides Google Classroom, Shkolo, Moodle, TED Talks, and Kahoot, there is a variety of digital tools, apps, and platforms that can foster language acquisition.

Figure 2. SWOT analysis to Digital pedagogy



Source: SWOT analysis is prepared for the purposes of this study

5. CHALLENGES OF DIGITAL LANGUAGE LEARNING

Digital learning provides challenges as well with motivating and engaging students in an online classroom. The aim is encourage them to participate in lessons. The lack of human interaction, however, because of the overreliance on technology may hinder face-to-face interactions and impede the development of oral communication skills. On the other hand, distractions on electronic devices may decrease learners' concentration during language learning sessions or the abundance of online resources can be a trap for learners because of the quality and accuracy of content to avoid misinformation and ineffective learning experiences.

6. INTEGRATING TECHNOLOGY INTO LANGUAGE TEACHING. GAMIFICATION AND QR CODE

Technology is constantly being integrated into the teaching methods, creating a blended learning environment. Language teachers have also embraced the digital age to enhance their teaching methods. It is often suggested that the stress of education digitalization is reduced through gamification tools. Gamification can involve both the use of special computer games with educational content and the use of available free game applications for the educational process gamification. For example, a certain level can be a reward for achieving a certain level of success. The learning process can utilize the character development pattern of a role-playing game (Nurhayati et al. 2023; Poole and Clarke-Midura 2020) as gamification affects effectively learners of all ages.

For example, the educational goal of I-FLEG, a game for SLA in a virtual environment, is to foster

SLA. It conveys linguistic knowledge to the learners making decisions in a reality-like environment.

In order to promote user-system interaction, to elicit the learner use of the L2 in context and to maintain their attention, I-FLEG exploits the following game techniques: free exploration of the environment; items gathering; point-and-click interaction with objects, and scoring mechanism.

Another way to integrate technology in the classroom is through the use of QR codes. Learners can submit homework, access schedules, or just view class materials. Creating QR codes allows teachers to quickly share different types of data, either creating their own learning materials and link them to QR codes or converting written materials to videos. The QR code below gives guidelines on 'Using QR Codes in the Classroom to Enhance Learning' (Boschen 2016):



Source: QR code is created for the purposes of this study

Cultural differences also influence language learning in the digital age. A study on the language that has originated and developed with the immersion of technologies and their application for language learning discusses the changes it undergoes. Language change results in different use of emoticons. Comparing the use of emoticons, in his cross-cultural analysis, Kavanagh (2010) found that the frequency of their use correlates with the high-low context distinction. Japanese as a high-context culture, for example, relies more on emoticons than the USA, a representative of a low-context culture because of the wide diversity of cultures within the United States.

"Nowadays social media and ICT inevitably remove the use of facial expressions, gestures, volume, pitch, and intonation of voice. This is where emoticons step in to make communication easier, more effective, and more expressive. One's feelings can be expressed by a single character-sized graphic only (Japanese word *e* (picture) and *moji* (character)) while onomatopoeia (*yap! ha-ha*) stimulates the sound" (Tsvetkova 2018).

7. CONCLUSION

Embracing technology in language learning enhances accessibility, flexibility, interactivity, and personalization benefiting learners from various backgrounds. Digital platforms provide interactive exercises, gamified quizzes, and real-time feedback allowing learners to practice in a dynamic and engaging manner. Such tools promote self-directed learning supporting learners in second language acquisition. However, certain challenges, such as reduced face-to-face interaction and potential distractions, must be acknowledged and managed effectively for optimal language learning outcomes. As technology continues to advance, it is essential to strike a balance between digital tools and resources and traditional teaching methods in second language acquisition. With the right approach the digital age can serve as a catalyst for language proficiency in an increasingly interconnected world. Balancing technology integration with traditional teaching methods is essential to foster comprehensive language development.

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PARENTS AND STUDENTS EXPERIENCES ON DISTANCE TEACHING: CHALLENGES FOR THE NEW ROLE OF THE TEACHER

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Abstract: The corona virus pandemic has changed the life of modern society in many segments. In this sense, the entire education and teaching format have been changed. Online teaching and learning is recognized as a valuable tool in the emerging situation. In this regard, the paper emphasizes the explanation of the concept of online teaching and learning, and then the experiences of students and parents and their evaluations of the success of remote teaching during the corona virus pandemic, with reference to the challenges faced by teachers in their to the new role of “online teachers”. The research is based on the constructivist and socio-cultural paradigm of contemporary teaching, which is situated in a technologically mediated information and communication context. The goal was to examine the experiences, opinions and satisfaction of students and parents with the applied teaching concept. The sample consists of 196 elementary school students in the territory of Vojvodina and 135 parents. A questionnaire (parallel form) was used for data collection with questions about strengths, weaknesses, teaching articulation and teacher engagement in supporting student learning (choice of work methods, creation of learning materials, feedback, encouragement, empathy and teacher workload). The results of the research showed that although they are generally satisfied with the realization of classes, 41% of students and 46% of parents do not accept the claim that distance learning should be extended even after the pandemic. Among the main disadvantages, students singled out a short deadline for homework and redundant messages on the platform, while the main advantage is the feeling of freedom, due to the absence of constant teacher control. The support and engagement of the teachers was rated more favorably by the students than by the parents. The implications of the obtained findings are discussed from the aspect of the new role of the teacher (moderator and facilitator) in the e-environment

Keywords: *online teaching, students, parents, teacher's role.*

Field: Social sciences

1. INTRODUCCION

With the onset of the pandemic caused by the appearance of the corona virus, the need for changes in the implementation of teaching came to the fore at all levels of education. In order to ensure continuity in teaching activities while immediate educational work in schools is stopped, all states, including the Republic of Serbia, have started implementing different models of online teaching, synchronous and asynchronous distance learning approaches (Matijašević, Carić and Škorić, 2021). In other words, regular teaching in classrooms was replaced by distance learning, and participants in the educational process were forced to use digital tools. Historically speaking, distance learning and education in earlier times were mostly connected and implemented within the framework of informal education, but now it seems that e-learning is gradually replacing the formal education system, so in this light a consensus has been reached among the authors that learning through modern technologies over time becomes the dominant form in the world of education (Milojević et al., 2020; Pivac, Pavkov & Zorić, 2021). Although it is considered that no alternative pedagogical approach can replace the greatest advantage of traditional formal education, which is the direct interaction of teachers with students, online teaching has proven to be an important model of pedagogically shaped work that has proven to be widely applied and very well accepted in pandemic conditions. Current practice shows that online teaching has led to a significant pedagogical shift, from traditional methods to modern approaches to teaching and learning — from the classroom to Zoom, from personal to virtual, and from seminars to webinars. The reason for the good acceptance, even the popularity of online learning is attributed to the high degree of flexibility and innovation in work compared to traditional programs and methods of educational work (Spasenović, 2021). The impact of information and communication technologies (ICT) on the education system has been very large in recent years, which had the effect that educational methods and approaches were improved as the technological, social and economic development of society proceeded (Matijašević, Carić and Škorić, 2021). In addition to the technical aspects of teaching, the impact of ICT on educational systems is also reflected in the change in the way teachers teach and the acquisition of knowledge by students. During the last decade, numerous authors emphasized the importance of implementing information and

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communication technologies in teaching because traditional education does not meet the educational needs of modern man (Džamonja, 2021; Spasenović, 2021). Today, the role of the teacher is different and much more complex, i.e. it is more of an encouraging role than a teaching one. With the advent of digital media when learning becomes temporally and spatially unlimited, the teacher's role on the continuum from knowledge transmitter and lecturer to learning manager and mentor changes (Pokhrel, S., & Chhetri, R., 2021). This shows that the role of teachers in the 21st century is becoming not only more complex, but also more dynamic. Just as the world in which teachers teach is not static, neither is the role of the teacher, who is at the same time a model and role model for students, leader, partner, mediator between students and knowledge, which all together requires continuous learning, continuous personal and professional development. It is understandable that teacher education does not end with initial education. Today's teachers must possess e-competencies in order to "speak the same language with the students of the 21st century" and in that light adequately play all the roles of a modern teacher (Papić, 2011).

2. METHODS OF RESEARCH

Numerous systemic and innovative changes that have affected the educational system in recent years. Since the organization and implementation of the teaching process with the advent of the corona virus pandemic was and still is a great challenge for all participants of the educational process, it is necessary to examine its effects and various aspects, including the opinions, attitudes and experiences of the actors themselves about online teaching. Feedback, obtained through research, provides an opportunity to look at strengths, weaknesses, shortcomings as well as potential for improvement. In this paper, the research is focused on examining the opinions of students and parents about the difficulties they faced and the positive experiences they had in online classes, which is important for a more complete understanding of the success of this way of working in each specific school, as well as the entire educational system.

For the purpose of conducting this research, a questionnaire was created: Opinions of students and parents about the organization and implementation of online classes during the Covid-19 pandemic. The questionnaire is based in some parts on the original version of the questionnaire created by the Step by Step Center for Educational Initiatives on student and parent evaluations of online classes during the Covid-19 pandemic, functionalized and adapted for the purposes of this research. For the purposes of this paper, some results of a wider research are presented.

The research sample consists of 331 respondents, of which 135 are parents and 196 students of the second cycle of primary education in schools from the territory of AP Vojvodina. As for the structure of respondents according to gender, 100 (74%) mothers and 35 (26%) fathers participated in the research, that is, 124 (63%) female students and 72 (37%) male students. According to the place of residence, more students from rural areas (121 students) participated in the research compared to the number of students from urban areas (75%), while in the sub-sample of parents there are also slightly more parents from rural areas (79%; 59%) than parents of students from urban areas (56%; 41%). Due to the specific epidemiological situation, the respondents filled out the questionnaire electronically. All respondents received the necessary instructions electronically and were familiar with the purpose of the research. The respondents' participation in the research was voluntary and anonymous. The data was collected in the second semester of the 2020/2021 school year. The obtained data were processed in the statistical program IBM SPSS for Windows version 23.

3. RESULTS AND DISCUSSION

The main goal of the research was to examine the opinion of students and parents about the realized concept of online teaching during the pandemic. By summarizing and analyzing the obtained data, we can conclude that the general hypothesis of the research has been confirmed, that is, that students and parents positively evaluate online teaching during the pandemic.

Table 1 The opinion of students and parents about online classes

Description of classes		1	2	3	4	5	X ²	df	p
Students work more than were working in regular classes	U	28 14%	35 18 %	30 15 %	78 40%	25 14%	9.393	4	< 0.01
	R	23 17%	33 24%	16 12%	37 28%	26 19%			
Pupils are making good progress in knowledge and skills	U	18 10%	24 12%	39 20%	73 37%	42 21%	17.32	4	< 0.01
	R	26 19%	29 22%	25 19%	41 30%	14 10%			
Student grades are the benchmark their knowledge	U	24 12%	19 10%	41 21 %	63 34%	49 25%	3.45	4	> 0.05
	R	17 13%	21 15%	28 21%	43 32%	26 19%			
Grades are important to students	U	6 3 %	12 6 %	21 11 %	65 33%	92 47%	5.73	4	> 0.05
	R	8 6 %	17 12%	15 11%	42 32%	53 39%			
Communication with friends from class is more intense through social networks	U	26 13%	16 8%	38 19%	74 38%	42 22%	10.66	4	> 0.05
	R	22 17%	23 17%	24 18%	33 24%	33 24%			
Students have more free time	U	37 19%	30 15 %	31 16 %	54 28%	44 22%	10.99	4	< 0.05
	R	30 22%	26 19%	21 16%	46 34%	12 9%			
Online teaching should continue even after the pandemic	U	81 41%	21 11 %	27 14 %	42 21%	25 13%	2.97	4	> 0.05
	R	62 46%	19 14%	19 15%	21 15%	14 10%			

(1)“I do not agree at all”; (2) “I generally disagree”; (3) “not sure”; (4) “mostly agree” to (5) “completely agree”

Source: Author’s research

In Table 1, where statements related to the description of online classes are given, it can be seen that most students (40%) and parents (28%) “mostly agree” with the first statement that students in online classes work more than they did in regular classes. The value of the χ^2 test ($\chi^2 = 9.393$; $df=4$; $p=0.005$) shows that the difference in the degree of agreement, that is, the distribution of the responses of students and parents to this statement is statistically significant. The agreement in the answers between parents and students is noticeable both on the second and third statement of the scale. Most students (37%) and parents (30%) “generally agree” with the statement that students are making good progress in knowledge and skills, despite the new way of learning. The differences in the distribution of student and parent responses are statistically significant for this statement ($\chi^2=17.318$; $df=4$; $p=0.002$). In the third statement, there is also a similarity in the answers of students and parents (34% of students and 32% of parents “mostly agree” with the statement that students’ grades in online classes are a measure of their current knowledge. The value of the χ^2 test ($\chi^2=3.447$; $df=4$; $p=0.485$) shows that the difference in the degree of agreement between parents’ and students’ answers to this statement is not statistically significant. As for the importance of grades, both groups of respondents emphasize the importance of grades that students receive at school, given that 47% of students and 39% of parents fully agree with the statement, that is, based on the value of the Chi-square test for the answers of students and parents ($\chi^2=5.783$; $df=4$; $p=0.216$), the statistical significance of these differences is not confirmed ($p>0.05$). communicate more intensively with other students in the class through social networks with the emergence of online classes. Parents’ responses show that (14%) parents “mostly agree” and the same number of those who “strongly agree” with this statement. The chi square test shows that the differences in the answers of students and parents are not statistically significant ($\chi^2=10.662$ $df=4$; $p=0.486$). With the statement that they have more free time during online classes, (28%) students “mostly agree” and (22%) “completely agree”. It is interesting to note that 16% of students are not sure whether they had more free time during online classes than during regular classes. In the sub-sample of parents (34%), they “mostly agree” that

students have more free time during online classes. On the contrary (22%) parents do not agree with the mentioned statement at all. Based on the analysis of the Chi-square test, we can conclude that the differences in the answers of parents and students are statistically significant ($\chi^2= 10.99$; $df=4$; $p=0.026$). Finally, it should be noted and the results of the last claim related to the extension of online classes after the pandemic. The interesting data is that (41%) of students and (46%) of parents do not agree at all with the above statement, that is, they believe that online teaching should not continue after the Covid-19 pandemic. Applying the Chi-square test between the responses of parents and students, we can conclude that the obtained data are not statistically significant, i.e. $\chi^2=2.97$; $df=4$; $p>0.05$ ($p=0.561$).

Based on the data given in Table 2, it can be concluded that the students most often followed online classes via Google Classroom (62%). 29 (15 %) respondents followed the class via Google Meet. The Zoom application was mentioned by 19 (10%) students, and 16 (8%) students mentioned Viber. Other applications were used much less frequently. Only 5 (3 %) students answered that during online classes they used Gmail as the most common application, 3 students mentioned Microsoft Teams (2 %) as the most common means of communication in distance learning. What As for the parents' answers, there is a noticeable similarity with the students' answers. Parents, they (55 %) also point out Google Classroom as the most common application for conducting online classes, followed by Google meet with (17 %) and Viber (14 %), Microsoft Teams is mentioned by (4 %) of parents and (2 %) of parents mention gmail. Only 1 parent stated that classes were most often organized through My Planet. The high similarity in the answers of students and parents indicates that the parents very carefully followed the way in which the teaching took place. The obtained research data on the frequency of use of certain applications in online classes are consistent with the results of research that dealt with the same topic (Baucal et al, 2022; Tichavsky et al, 2015). Regarding the attitude of students and teachers regarding the use of online classes after the Covid-19 pandemic, 41% of students and 46% of parents do not accept this possibility. Only 21% and 15% of parents consider that option acceptable. Online teaching offers many possibilities for its realization. The use of certain methods and techniques in online teaching represents the free choice of teachers and students, and their application mainly depends on the teaching content. Here it is necessary to point out that the different use of applications in online classes is primarily influenced by the competence, commitment and choice of the teacher, as well as the teaching content itself (Hammer, Scheiter & Stürmer (2021).

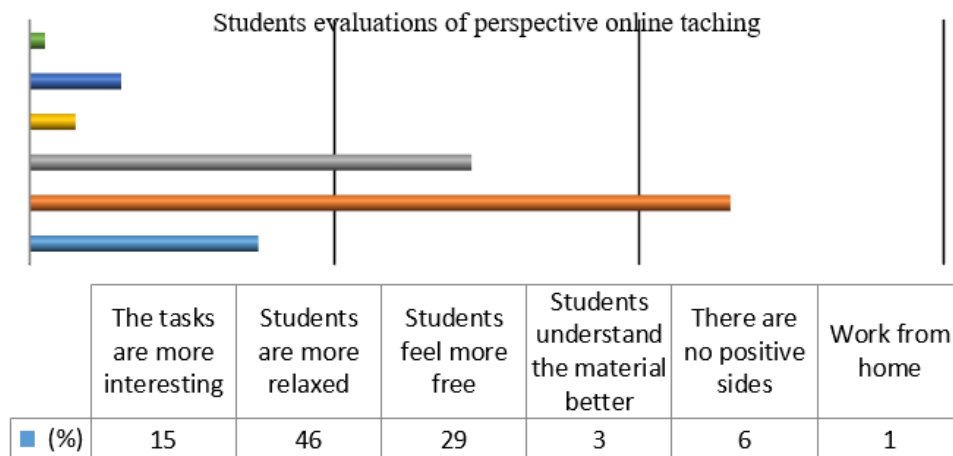
Table 2 The most common applications in online teaching

The most common applications in online teaching:	students	parents
Google classroom	123 (62%)	74 (55 %)
Google meet	29 (15%)	23 (17 %)
Zoom	19 (10 %)	10 (7%)
Viber	16 (8 %)	19 (14 %)
Gmail	5 (3 %)	2 (2 %)
Teams	3 (2 %)	6 (4 %)
My planet	0	1 (1 %)

Source: Author's research

When asked about the positive characteristics of online classes, students mention several characteristics. The most prominent positive side of online classes is, according to the students' answers (Figure 1), "the relaxation that students have when conducting online classes" with 124 (46%) answers.

Figure 1 Student evaluations of the positive aspects of online teaching

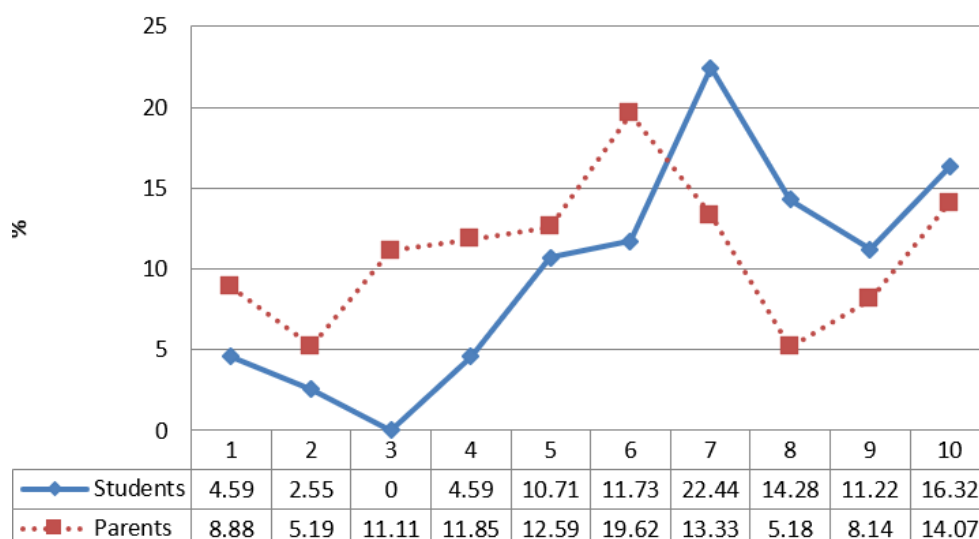


Source: Author's research

Also, 29% of students state that they “feel freer” during online classes, i.e. they do not have the feeling that they are under the constant supervision of the teacher. A number of students, 40 (15 %) students point out that “tasks are more interesting” in online classes, while 10 (3 %) students believe that “they understand the material better this way”. In addition to the offered answers, the students had the opportunity to write positive aspects of online classes that were not mentioned in the question. The most common answer of 17 students (6%) was that online teaching has no positive aspects. Based on the data presented, it can be concluded that for students, the most prominent positive effect of online classes is relaxation during classes. The obtained finding contradicts the research results of the group of authors (Rakočević et al, 2020), and the reason for this can be attributed to the sample consisting of high school students in which the program includes rather more complex teaching content.

The general rating that students and parents give to online classes on a scale of 1 to 10 indirectly indicates their degree of satisfaction with the implementation of classes, which is in line with previous research (Rakočević et al, 2020; Dobrić & Đurić, 2021). Figure 2 shows the respondents' answers.

Figure 2 Overall rating of online classes
Overall rating of online classes



Source: Author's research

The data show that both students and parents are generally satisfied with the implementation of online classes. However, the students are more satisfied and even 76% of the students and 60% of the parents evaluate the online education with grades from 6 to 10. The majority of students (22.44%) rated online teaching with a grade of 7, and as many as 16.32% opted for a grade of 10. The third rank in terms of frequency of student responses (14.28%) has a grade of 8. Parents were more critical in their

assessment of online teaching and less inclined to high grades than students. Considerable ambivalence can be observed in the answers of parents, as 5 to 10% of parents are not at all satisfied with online teaching and rate it with 1 and 2. On the other hand, the same number of parents rate online teaching with grades 8 and 9, and 14% with the highest score of 10. From the data in the graphic, it can be seen that the largest number of parents (19.62%) opted for grade 6. The average grade of online teaching among students is AS = 6.7. While in the case of parents it is AS=5.6. Differences in teaching satisfaction examined by the Chi-square test show that the differences in student and parent ratings are statistically significant ($\chi^2=34.29$; $p < 0.001$).

4. CONCLUSION

Social distancing, which occurred in all countries around the world as a result of the pandemic, made it impossible for students to attend classes regularly. Educational institutions have found an alternative, that is, online classes have been organized, providing many opportunities, but despite this, there are also certain shortcomings. In order to understand the concept of online classes more fully, the opinion of students and parents, that is, their acquired experience, is of great importance. The results of this empirical research showed that students and parents are generally satisfied with the implementation of online classes, but at the same time, as many as 41% of students and 46% of parents disagree with the statement that online classes should continue even after the Covid-19 pandemic. The reasons can be attributed to many limiting factors. One of the crucial factors for the successful application of new educational technologies is a digitally competent teacher (Dobrić & Đurić, 2021). Actuality in monitoring innovations in teaching, as well as the training of teachers in accordance with the changes, represent the imperative of the time in order to adequately respond to the various needs of today's students (Tančić, 2022). Drawing attention to the specifics of distance learning, upgrading knowledge about ICT as well as reflective practice seems necessary on the way to high-quality educational work of teachers and responsible assumption of new roles. The teacher is expected to take on different roles as a change agent, a consultant in the learning process who possesses a high degree of empathy, creativity and responsibility so that he can follow the dynamic educational environment in the digital era.

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WORKPLACE QUALITY AND PROFESSIONAL DEVELOPMENT IN THE IT SECTOR: CONSTRUCTION AND VALIDATION OF COMPOSITE INDICES

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Abstract: The aim of this study is to examine the key organisational factors that shape the work experience of employees in the IT sector, with particular emphasis on physical working conditions and support for professional development. Based on data collected in an IT company, two composite indices were constructed – the Workplace Environment Index and the Professional Development Index – comprising a total of nine indicators assessed on a 1–7 Likert scale. The results indicate a high level of satisfaction with physical working conditions (Mean = 6.12) and an exceptionally positive perception of developmental opportunities within the organisation (Mean = 6.39). However, the analysis of internal consistency shows that both sets of indicators do not function as reflective scales ($\alpha = 0.095$ and $\alpha = -0.158$), which confirms their formative nature and the distinctiveness of the individual dimensions. To further refine the interpretation of these constructs, complementary analyses of item-level contributions and correlation structures were performed. The matrices revealed extremely low or negative relationships among the indicators, implying that respondents evaluate different aspects of the working environment and professional development independently of one another. These findings highlight the multidimensional character of workplace quality in the IT sector, where individual elements contribute separately to employees' overall perceptions rather than forming unified latent constructs. The study therefore emphasises the importance of applying formative conceptualisations when modelling such organisational phenomena, particularly in structural equation modelling, where reflective misspecification may lead to erroneous inference. Beyond methodological insights, the results provide a more nuanced understanding of employee experience in IT organisations. High descriptive scores indicate that the organisation provides a well-supported, adequately resourced, and development-focused work environment – factors widely recognised as enhancing employee retention, satisfaction, and long-term organisational commitment. At the same time, the independence of the measured dimensions suggests the need for targeted, domain-specific HR strategies that address each aspect separately rather than through a unified approach. Taken together, the results demonstrate that these constructs are appropriately applied as formative measures, or as sets of distinct predictors within structural equation modelling, thereby ensuring methodological rigour and theoretical coherence in analyses conducted within the IT sector.

Keywords: workplace environment; professional development; IT sector; human resources; composite index.

Field: Social Sciences, and Humanities.

1. INTRODUCTION

In empirical research, particularly studies that encompass complex organisational and psychosocial phenomena, individual variables often represent only partial and fragmented indicators of a broader theoretical construct. Relying solely on a single item or a small number of isolated items may lead to an incomplete understanding of a phenomenon, as different aspects of the same concept may be interrelated and contribute to the construct in complementary ways. For this reason, contemporary research approaches increasingly employ composite indices as a means of integrating multiple relevant dimensions into a single measure that more accurately reflects the true complexity of the phenomenon under observation (Spyropoulos et al., 2021; Stefana et al., 2021). In this study, two composite indices were applied: the first encompasses indicators of physical working conditions (hygiene, modern offices, kitchen facilities, equipment quality, and workspace climatization), while the second integrates key elements of employees' professional development (training, opportunities for advancement, time for acquiring knowledge, and mentoring). These domains are multidimensional by nature, and representing them through composite measures provides a more comprehensive and methodologically precise picture of the organisational context in which employees operate.

The formation of composite indices contributes to greater stability and robustness of measurement. By combining multiple indicators, the influence of random error in individual items is reduced, and the reliability of construct-level estimation is enhanced. In this way, the index becomes a conceptually rich yet analytically concise measure that enables the researcher to observe the studied phenomenon holistically (Tsounis et al., 2023; Daadmehr, 2024). This is particularly important when the constructs

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relate to working conditions, professional development, or similar organisational categories that cannot be adequately captured by a single variable. An additional advantage of composite indices lies in simplifying interpretation and improving statistical analysis. Instead of conducting multiple separate analyses for each item, aggregating variables into unified indices reduces data complexity, yields more interpretable results, and enables the more efficient application of inferential statistical methods. This includes clearer group comparisons, more precise modelling of relationships between constructs, and easier interpretation of findings in the discussion (Abramov, Vasilchenko & Seleznev, 2025; Minh et al., 2024). Although individual items may not always form a psychometrically homogeneous scale, their aggregation retains substantial descriptive and analytical value. Composite indices allow physical working conditions and employees' professional development to be examined as holistic organisational phenomena, contributing to a more complete understanding of the work context and supporting conclusions relevant to human resource management and organisational development planning.

The primary research (Kukolj, Deretić & Kamiš, 2023) was designed with the aim of examining respondents' attitudes and opinions regarding quality of work life and employee motivation within a team of an IT company. Data were collected through direct questionnaire-based surveying, with voluntary participation. The research sample was formed through purposive sampling of employees in a private IT company. The pilot study included 10 participants, while the final number of respondents was 70 ($n = 70$). The study was conducted in May 2023. The present paper uses data from the primary research (Kukolj, Deretić & Kamiš, 2023). This decision is methodologically justified, as processing the entire dataset with all analytical techniques planned within the broader research project exceeds the scope of a single paper. Therefore, the data from the original study were re-analysed here in accordance with the specific aims and the analytical focus of the current research.

The structure of the paper comprises five interconnected chapters that guide the reader logically from the theoretical framework to the empirical results and future research directions. The introductory chapter presents the theoretical foundations and research context, explaining why composite indices represent an appropriate method for measuring complex organisational phenomena such as the work environment and professional development in the IT sector. The second chapter provides a detailed description of the construction and analysis of the composite Work Environment Index, presenting descriptive results and indicators of internal consistency that show the dimensions of physical working conditions function as independent indicators, thereby confirming the formative nature of this construct. The third chapter focuses on the Professional Development Index, analysing descriptive statistics and psychometric characteristics that demonstrate employees' strongly positive perceptions of developmental opportunities, while also revealing that certain dimensions differ in how they are perceived, meaning they do not form a common latent structure but rather a formative whole. The discussion interprets these findings within the Structural Equation Modelling (SEM) methodological framework, emphasising the distinction between reflective and formative models and the methodological implications that the choice of construct type has for model specification and result interpretation. Finally, the conclusion synthesises the key research findings, confirms the appropriateness of the formative approach for further SEM modelling, and proposes future research directions involving model testing across different samples as well as the potential inclusion of additional predictors and moderators to enhance analytical precision and robustness.

2. COMPOSITE INDEX – WORKPLACE ENVIRONMENT

For the purposes of this research, a composite Workplace Conditions Index was constructed, calculated as the arithmetic mean of five variables measuring satisfaction with key elements of the physical working environment: hygiene, modern office space, kitchen facilities and related amenities, equipment quality, and workspace climatization. All variables were measured using a 1–7 Likert scale, which enabled their direct aggregation into a single index (Table 1). The resulting index indicates a high level of satisfaction with working conditions ($M = 6.12$; $SD = 0.33$), with a very narrow range of scores (min = 5.40; max = 6.80), suggesting a consistently and uniformly positive perception of the physical aspects of the working environment. The low variability implies that there are virtually no distinctly negative assessments among employees and that working conditions are perceived as a stable and reliable component of overall work life quality. The high index values further confirm that the physical work environment in the company is unlikely to be a source of dissatisfaction; rather, it contributes to a generally positive workplace climate and supports other dimensions of organisational satisfaction and motivation.

Table 1. Descriptive statistics of the Workplace Environment composite index

N	Mean	Std	Min	Max	Median	1st quartile	3rd quartile	IQ
70	6,12	0,33	5,4	6,8	6	5,8	6,4	0,6

Source: Authors' analysis based on the sample from Kukolj, Deretić & Kamiš (2023)

The internal consistency of the scale composed of five variables measuring hygiene, modern office facilities, kitchen areas, equipment quality, and workspace air-conditioning was assessed using Cronbach's alpha coefficient. The obtained value of $\alpha = 0.095$ indicates an exceptionally low level of internal reliability. This result clearly suggests that the variables do not form a unified psychometric scale and cannot be treated as a single latent construct in the sense of measuring the same underlying phenomenon. Although they conceptually belong to the domain of physical working conditions, they do not demonstrate statistical interrelatedness nor consistent covariation. In other words, employees evaluate these dimensions independently — a high score for hygiene does not necessarily imply high ratings for equipment, air-conditioning, or kitchen facilities, which results in the low alpha value.

An additional analysis was conducted to determine whether any individual variable disproportionately influenced internal consistency. Cronbach's α was recalculated after excluding each variable from the scale. The largest increase in reliability was observed when the variable 'kitchen areas' was removed, raising Cronbach's α from 0.095 to 0.144. This indicates that satisfaction with kitchen facilities and related amenities differs from the remaining dimensions of the physical work environment, confirming its heterogeneity relative to the other items. Nevertheless, even after removing this item, the coefficient remains low, which is expected given that each variable represents a distinct dimension of working conditions rather than a psychometric scale with multiple indicators per dimension.

The correlation matrix of the five variables measuring elements of the physical work environment shows that all correlations are extremely low, ranging from -0.11 to 0.19 (Table 2). This pattern demonstrates that respondents assess each aspect of the workspace independently, without any clear tendency for high ratings on one item to be associated with high ratings on another. Accordingly, there is no observable linear relationship among the items, which is further corroborated by the low Cronbach's alpha coefficient. These findings suggest that the observed variables represent separate indicators of physical working conditions rather than a single latent dimension.

Table 2. Correlation matrix for the composite index Work Environment

Variable	Hygiene	Modern offices	Kitchen facilities	Equipment quality	Workspace air-conditioning
Hygiene	1				
Modern offices	-0,066	1			
Kitchen facilities	-0,047	0,190	1		
Equipment quality	0,176	-0,071	-0,111	1	
Workspace air-conditioning	0,158	-0,080	-0,030	0,130	1

Source: Authors' analysis based on the sample from Kukolj, Deretić & Kamiš (2023)

3. COMPOSITE INDEX – SUPPORT FOR PROFESSIONAL DEVELOPMENT

To assess employees' professional development, a composite Professional Development Index was constructed as the arithmetic mean of four key variables capturing different dimensions of workplace learning and advancement: training, promotion opportunities, time available for acquiring knowledge, and mentoring. These variables encompass a wide range of developmental processes – from formal and informal learning, through employees' subjective assessment of promotion prospects, to the evaluation of available time for learning and the quality of mentoring support received. All variables were measured on a 1–7 Likert scale, which enables their direct aggregation into a single index (Table 3). The resulting index indicates a notably high level of professional development within the organisation ($M = 6.39$; $SD = 0.30$). The value range (5.50–7.00) shows that all ratings fall within the upper segment of the scale, with no low scores recorded, indicating consistently positive employee experiences. The small standard deviation reflects a high level of homogeneity in responses, meaning that most employees share a very similar perception of the availability of learning and advancement opportunities. These findings suggest that the organisation provides a stable and stimulating environment for professional development, offering employees clear opportunities to enhance their knowledge, progress in their careers, and receive adequate mentoring support. As a composite measure of multiple aspects of workplace learning, the Professional

Development Index provides a comprehensive insight into the organisation’s systematic approach to employee development and confirms the existence of a positive developmental and educational climate.

Table 3. Descriptive statistics of the composite index Support for Professional Development

N	Mean	Std	Min	Max	Median	1st quartile	3rd quartile	IQ
70	6,39	0,3	5,5	7	6,25	6,25	6,69	0,44

Source: Authors’ analysis based on the sample from Kukolj, Deretić & Kamiš (2023)

The internal consistency of the composite measure formed from four indicators of employee development – professional training, promotion opportunities, time available for acquiring knowledge, and mentoring – was assessed using Cronbach’s alpha. The obtained value of $\alpha = -0.158$ indicates a complete absence of internal reliability. A negative alpha shows that the indicators do not share a common latent structure and do not measure a single psychological or organisational dimension. Their variability moves in opposing directions, reflected in negative inter-item covariances. Although conceptually linked to professional development, respondents evaluate these indicators as separate phenomena; high scores on one aspect (e.g., mentoring) do not imply higher scores on others. This explains the extremely low and negative coefficient. Methodologically, such a result shows that the indicators cannot be combined into a reliable composite index and should be analysed as independent measures of different facets of organisational support. Further analysis examined the impact of each indicator on internal consistency. Removing the mentoring indicator produced the most favourable change (α rising from -0.158 to -0.019), suggesting that mentoring is evaluated differently from the other dimensions. In contrast, excluding promotion opportunities further reduced alpha ($\alpha = -0.301$), indicating that this indicator diverges most from the others. Regardless of item removal, alpha remains very low, which is expected given that the indicators represent substantively distinct aspects of employee development rather than a unified latent construct. Their separate treatment is therefore empirically justified.

The correlation matrix of the four variables shows that the relationships among the indicators are very weak, and in several cases negative (Table 4). The highest correlation is only $r = 0.123$, confirming the absence of a shared underlying factor. Although conceptually related, respondents perceive these aspects of professional development independently, which means they cannot be combined into a single reliable measure.

Table 4. Correlation matrix for the composite index Support for Professional Development

Variable	Hygiene	Modern offices	Kitchen facilities	Equipment quality
Hygiene	1			
Modern offices	0,123	1		
Kitchen facilities	-0,073	-0,049	1	
Equipment quality	-0,193	0,004	-0,009	1

Source: Authors’ analysis based on the sample from Kukolj, Deretić & Kamiš (2023)

4. DISCUSSION

In SEM analysis, latent constructs may be conceptualised and measured in two principal ways: through reflective measurement models or formative measurement models. The choice between them depends on whether the indicators reflect the latent construct or whether they form it. This distinction directly affects how constructs are incorporated, tested, and interpreted within a SEM framework (Aguirre-Urreta et al., 2024; De Giovanni, 2025). In reflective measurement models, constructs are treated as latent dimensions manifested through interconnected indicators, whereas formative constructs are modelled as composite entities formed from multiple mutually independent indicators. Reflective models require the assessment of factorial structure and internal reliability, while formative constructs are evaluated by examining the contribution of each indicator and the absence of multicollinearity. This approach allows both types of constructs to be combined within a single SEM model, depending on the nature of the phenomenon being measured. Furthermore, the choice of construct type determines how indicators are handled during modelling: reflective indicators may be removed if they compromise the measurement model, while formative indicators are essential components of the construct and must not be omitted without theoretical justification. This ensures that each construct is modelled in line with its conceptual logic, thereby increasing the validity and interpretative precision of the overall SEM model.

The Work Environment Composite Index was formed as the arithmetic mean of five indicators of

satisfaction with physical workplace elements. The results show a very high average level of satisfaction ($M = 6.12$) with minimal variability ($SD = 0.33$), indicating a homogeneous and consistently positive perception of the work environment. The response range (5.40–6.80) confirms the absence of negative evaluations and suggests that employees perceive physical working conditions as reliably high in quality. However, despite these favourable mean values, the indicators do not function as a unified psychometric construct. The low Cronbach's α (0.095) and the very weak inter-item correlations (-0.11 to 0.19) indicate that the individual dimensions – hygiene, air-conditioning, equipment quality, kitchen facilities, and modern office design – are not related. This means that employees evaluate each aspect independently rather than as part of a single latent construct. Methodologically, these items are therefore unsuitable for a reflective model, but the composite index can be used meaningfully as a formative measure, where each indicator represents an independent contribution to understanding physical working conditions. In summary:

- Physical working conditions receive very high ratings.
- The dimensions operate as independent indicators, which makes the index appropriate as a formative rather than a reflective measure.

The Professional Development Index comprises four dimensions: training, promotion opportunities, time available for learning, and mentoring support. Descriptive results ($M = 6.39$; $SD = 0.30$) indicate high and uniform evaluations of developmental opportunities, with no negative items, suggesting a stable level of organisational support for professional development. However, the psychometric structure of the composite indicates that these indicators are not interrelated. The negative Cronbach's α (-0.158) and the low correlations among the indicators (-0.09 to 0.123) demonstrate that the different aspects of professional development are perceived separately. A high rating for one component (e.g., mentoring) does not imply a corresponding rating for the others. Consequently, the Professional Development Index cannot be treated as a reflective scale representing a single latent construct. Instead, the indicators function as autonomous components that are conceptually related but empirically unconnected. Nonetheless, the index remains useful as a formative measure, where each indicator contributes uniquely to the overall assessment of developmental opportunities. In summary:

- Employees evaluate all aspects of professional development very positively.
- The indicators lack psychometric coherence and the index is therefore applicable only as a formative, not a reflective, measure.

5. CONCLUSION

In preparation for SEM modelling, the internal consistency of the Work Environment and Support for Professional Development constructs was examined to assess their suitability for further analytical use. The low values of Cronbach's alpha demonstrate that these constructs do not operate as reflective scales; however, this does not limit their application in SEM. Rather, it suggests that they are more appropriately conceptualised as formative structures.

Work Environment. The five indicators (hygiene, modern offices, kitchen facilities, equipment quality, and air-conditioning) produced $\alpha = 0.095$, showing that employees evaluate these dimensions independently and that they do not share a common latent basis. This pattern is consistent with a formative conceptualisation, where physical working conditions are understood as separate but conceptually related aspects.

Support for Professional Development. The four indicators (training, promotion opportunities, time available for learning, and mentoring) yielded a negative reliability coefficient ($\alpha = -0.158$), indicating that the dimensions vary independently and do not form a single latent structure. These findings support the treatment of the indicators as formative components or as independent variables within the SEM framework.

Although the α values clearly show that the constructs lack reflective internal consistency, this does not constitute a limitation for SEM analysis. Instead, the results suggest that both constructs are more appropriately viewed as formative composites, where each indicator contributes to the broader concept, or as separate independent variables depending on the theoretical framework. Such an approach ensures methodological accuracy and allows valid interpretation of the relationships within the model. Future research should focus on testing a SEM model based on the formative constructs Work Environment and Support for Professional Development. Particular attention should be given to assessing the stability of the model across different samples and organisational contexts. It is also recommended to explore alternative model specifications, including additional predictors and moderators, to enhance the robustness and validity of the findings.

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DIGITAL TRANSFORMATION AND INDUSTRIAL COMPETITIVENESS OF SERBIA IN COMPARISON TO THE EUROPEAN UNION

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Abstract: In the scientific study, we attempt to examine Serbia's industrial competitiveness and digital transformation processes in relation to the European Union (EU). An empirical combined methodological approach was employed. The quick blending of quantitative and qualitative understanding of economic processes was indicative of this tendency. Data sets from the EU Digital Economy and Society Index (DESI) 2024, as well as development indicators from the World Bank, Eurostat, and the Statistical Office of the Republic of Serbia, all represented the quantitative component. The findings show that while there has been some progress in the digitalization of electronic administration and widespread improvement of internet infrastructure, there has been a decrease in the population's use of digital platforms, a decrease in their capacity for innovation, and an incomplete digitization of small and medium-sized businesses when compared to EU countries. According to empirical data, Serbia's digital alignment and competitiveness lag behind those of the EU. The study indicates that increased integration with EU digital policy, increased investments in educational innovation sectors, and increased coordination between the public, corporate, and academic sectors are all necessary. The ideas include boosting the industrial sector's and the general public's digital literacy process, encouraging more research and entrepreneurial endeavors, and facilitating more effective access to high-speed Internet in a wider context. The results, which indicate that Serbia's DESI index equivalent is still approximately 30% below the EU average, highlight the need for more effective harmonization in Serbia.

Keywords: *industrial competitiveness; Serbia; European Union; DESI; digital economy; innovation; digital skills; empirical analysis; policy alignment.*

Field: Social sciences.

1. INTRODUCTION

In the research overview of the key indicators of the development of the digital economy of Serbia in its approximation with the European Union, we used quantitative analytical data through data sets from the digital economy and society index EU (DESI) 2024, processes of development indicators of the World Bank, Eurostat and the Statistical Office of the Republic of Serbia., qualitative indicators are extracted from national documents on digital strategy and analytical approach of experts who have dealt with this field (Regodić, Matić, Regodić, & Živić, 2021).

The current state of Serbia's digital economy is reflected in the paradigm and challenges of global intensive transformations of the economic and business environment under the influence of Industrial Revolution 4.0. (Зековић & Хаџић, 2020; Komazec, Bukvić, Dimitrijević, & Petrović, 2022)

The necessity of a national approach through the improvement of institutional support for a more efficient digitalization of society and the economy is based on the Strategy for the Development of the Information Society until 2020, and then the key priorities in six segments were emphasized: necessity of constant development of digital communication in business, E-government, E-health, E-justice, ICT education, E-sciences and cultures.

This approach of the state is part of the Digital Agenda and refers to maximizing the use of ICT opportunities for the purpose of increasing economic growth, efficiency, employment, and improving the quality of life (Dakić, Heričko, Kljajić, & Todorović, 2025; Vidas-Bubanja & Popovčić-Avrić, 2018).

The transformative character of the fourth industrial revolution, labeled Industry 4.0, (Vidosav D. Majstorović, Mitrović, & Mišković, 2020), places innovations such as robotics, artificial intelligence (AI), the Internet of Things (IoT), and automation as the main elements of production processes in various aspects (Ali, Ali, Dakić, & Zoltan, 2024; Haiderzai, Dakić, Stupavský, Aleksić, & Todorović, 2025; Todosijević, Dakić, Heričko, Kljajić, & Todorović, 2025). Serbia lags behind the EU in comprehensive processes of digital transformation. This is especially related to innovative technological leadership and changes in companies and among the general population, which have not matured (Maksimović, Vlašković, & Damjanović, 2025). Despite the efforts of the SMIC center and the DEAL laboratory, the lack of human expertise, insufficient financial investment, and the gap between cities and rural areas slow down the more effective application of new technologies. The necessity of rapprochement of the economic environment

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with the EU lies in the strengthening of the educational system, efficient education of the workforce, greater support for small and medium-sized enterprises, and greater investment in digital infrastructure (Dakić, Todorović, & Vranić, 2023).

The current situation was observed through research on the level of the digital divide in the countries of the EBRD and the European Union. The stumbling block of the rapprochement between Serbia and the European Union lies in our National Education System, which should be systematically looked at and, as much as possible, encourage digital skills and competences of both individuals and society. Formal and non-formal education should aim to cancel the digital inequalities of the population in rural and urban areas. Skill building refers to:

- Developing the ability to access, find, select, and interpret adequate information on the Internet
- Improving critical thinking
- Willingness to exhaust the possibilities of the Internet to respond more readily and intuitively to challenges

challenges

- Motivating to access digital technologies
- Creating a creative environment for participating in online economic activities
- Creating new knowledge in a digital environment using digital technologies.

Within each section, different aspects are formed that are in direct connection with the topic and the defined abstract, and have the appropriate organization. So, the article is organized in the following sections and contains: Introduction, Materials and methods, results, discussion, and conclusion.

2. MATERIALS AND METHODS

In the research, we implemented a mixed method based on the placement of qualitative elements with quantitative ones. The quantitative analytical approach consisted of data taken from sources such as Eurostat, the World Economic Forum, the Digital Economy and Society Index (DESI). The information showed a comparative analytical overview of Serbia and the member states of the European Union regarding industrial competition and digital change processes. The qualitative approach in the research looked at strategic national documents (Regulatorna agencija za elektronske komunikacije i poštanske usluge-RATEL Palmotićeve 2, 2021) and relevant academic content in order to observe the convergence of Serbia's digital policies with EU standards and guidelines. By mixing qualitative observations with quantitative results, we observed the capacities of innovative technological applications of Serbia in relation to the European Union.

The results were measured through the prism of several quantitative and qualitative indicators. Quantitative indicators represent comparative indices (e.g., DESI value elements of Serbia and the EU average).

Then they showed the trends of digital changes in the previous 5 to 10 years. The indicators look at industrial values and competition in terms of productivity, investments in innovation, the share of the ICT sector in GDP, and the export of technology-intensive products.

In this research, the output results were measured through several quantitative and qualitative indicators:

1. Quantitative indicators

Comparative indices (e.g., DESI component values of Serbia and the EU average).

Changes over time - digital transformation trends in the past 5-10 years.

Indicators of industrial competitiveness: productivity, export of technology-intensive products, investment in innovation, share of ICT sector in GDP, composite evaluations in the form of calculation of normalized values and comparison of ranks.

2. Qualitative indicators related to the assessment of compliance with EU policies, the perception of barriers, composite evaluations - calculation of normalized values, and comparison of ranks, overview of policy implementation based on evaluation studies.

3. The comparative analysis referred to the comparison of Serbia with the EU average and selected member states, as well as the recognition of Serbia's lagging or progress in relation to the EU standard.

2.1. Selection Criteria

The initial basis for the selection of relevant literature was based on the actuality of the research topics. The selection process was carried out based on the use of segments of research works that are in line with sustainable housing trends.

Formulation of research questions

The use of digital technologies in the digital industry is a way of convergence with the European Union. Modern trends and innovations are standards that have been set at the global level and are

necessary for the future transformation of the Industrial Economy of Serbia and a better standard of the population.

Based on the defined strategies, the following research questions are proposed:

- 1) How should the National Strategy implement practical education of the population to acquire digital literacy that can be further used in the digital industry?
- 2) What are the challenges when integrating the digital processes of spreading fast internet?

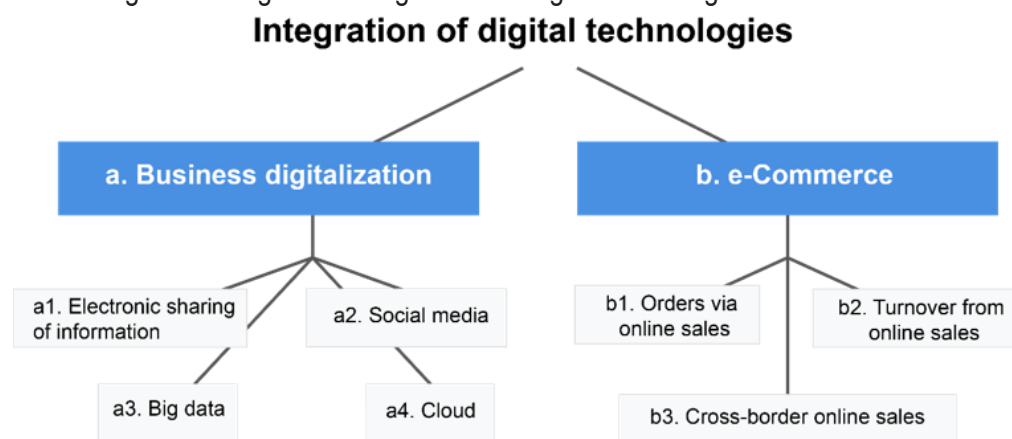
3. RESULTS

This chapter refers to the consideration of the key elements of the research in relation to the existing literature and theoretical frameworks. Discussion provides a link between the results of quantitative and qualitative analyses. The intention is to notice the differences between Serbia and the European Union in terms of digital transformation and industrial competitiveness (Dakić, Stupavský, & Todorović, 2024). A special focus is placed on explaining the observed trends, identifying factors that influence development, as well as on the implications these findings have for future policies and practices (Andrejević Panić, Milićević, Cvetanović, & Mulić, 2025).

New trends refer to the representation of various online contents (movies, music, video games, online social interaction, etc.), current forms of business communication (video calls), and electronic transactions (electronic banking and economic transactions of buying and selling via the Internet).

The subcategories included in the category use of internet services and their indicators are shown in Figure 1. The value of the category Use of internet services for Serbia in 2020 is slightly lower compared to the value of the previous year. A comparison with the countries of the European Union in this area is not possible, given that the category of using internet services is excluded from the DESI calculation methodology from 2021, according to which the values for the EU were calculated. The absence of this category is a consequence of the alignment of the Digital Economy and Society Index with the goals set by the European Commission in the field of digital transformation, which must be achieved by 2030. These goals are grouped into four basic areas: digital skills, digital infrastructure, digital transformation of companies, and digitalization of public services. Monitoring of the achievement of the set goals will be done through the Digital Economy and Society Index, which will accordingly be structured to monitor four areas of focus in digital transformation as shown on Figure 2. The values of individual indicators for Serbia in 2020 are listed below (Regulatorna agencija za elektronske komunikacije i poštanske usluge RATEL Palmotićeve 2, 2021).

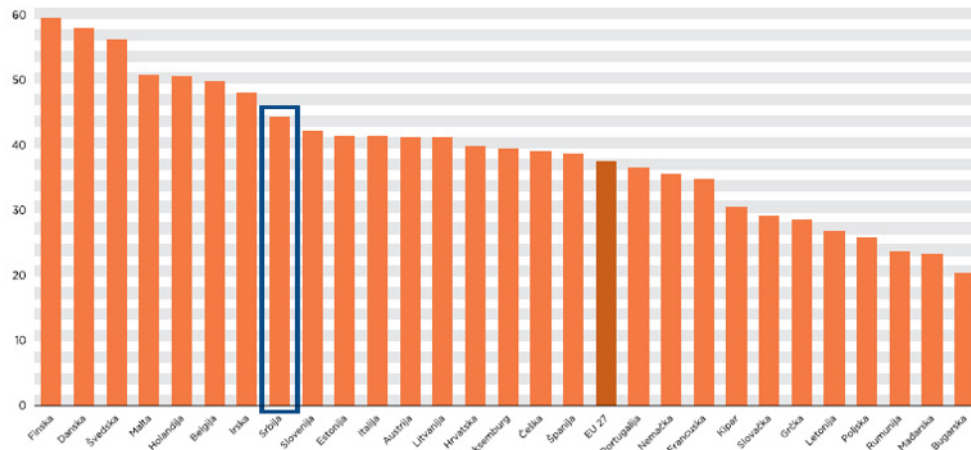
Figure 1. Integration of digital technologies: subcategories and their indicators.



Source: adapted from (Regulatorna agencija za elektronske komunikacije i poštanske usluge RATEL Palmotićeve 2, 2021) translated into the English language.

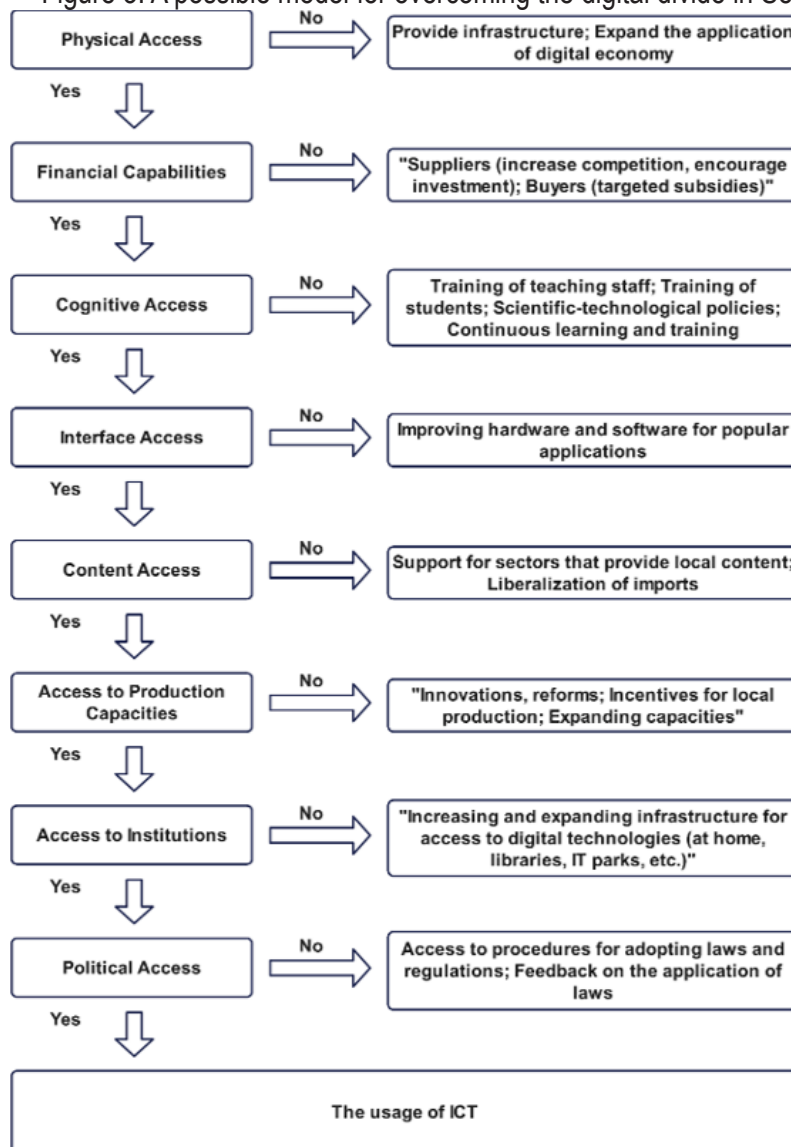
The most successful countries in this area are Finland, Denmark, and Sweden, while Bulgaria, Hungary, and Romania have the lowest values in the EU as shown on Figure 2. The values of the category Integration of digital technologies for EU countries and Serbia are presented in Figure 2, while the comparison of Serbia with a cluster of comparable countries and neighboring countries is shown in Figures 2 and 3. Although the values in this area are slightly lower than the previous year, Serbia, according to the indicators in the category Integration of digital technology.

Figure 2 Values of the category Integration of digital technologies for EU countries and Serbia for the year 2020



Source: (Regulatorna agencija za elektronske komunikacije i poštanske usluge RATEL Palmotičeva 2, 2021)

Figure 3. A possible model for overcoming the digital divide in Serbia.



Source: adapted from (Mitrović, 2022) translated into the English language.

By analyzing the current level of the digital divide in the countries of the EBRD and the European Union, to slow down the digital convergence between the countries of Serbia and the European Union is the National Education System in Serbia, which should recognize and encourage digital skills and competences so that a percentage of the population becomes digitally involved when conducting business correspondence, more efficient functioning of society (Mitrović et al., 2019). Some of the digital skills that residents should improve through the system of formal and informal education to reduce social and digital inequalities are:

- the ability to access, find, select, and interpret information and knowledge on the Internet;
- think critically;
- willingness to respond practically and intuitively to challenges and opportunities in ways that fully exploit the potential of the Internet;
- have a motive to access and use digital technologies;
- digital creativity that encourages individuals to actively participate in online activities;
- the ability to create an opinion in a digital environment, to create and accept new knowledge using digital technologies.

4. DISCUSSIONS

Applying the research opus, we noticed the possibilities of advancing the digital economy as a prospective potential of Serbia. We created the conditions for further research in this branch of the industrial economy as a prerequisite for future European and world trends that increasingly rely on innovations in AI and digital resources. The necessity of a national strategy to more efficiently and concretely enable the wider masses of the population in rural areas to use digital technologies, with the accompanying transformation of the educational system, which will be in line with the most developed countries of the European Union and the world, will contribute to comprehensive progress.

RQ1: The national strategic approach should enable a multi-layered and practical approach to the digital process by specifying operational steps through professional training at all levels of education and age of the population. This includes the implementation of digital classrooms at all school and college levels, the development of effective specialized programs that rely on Industry 4.0 technologies. The emphasis is on the involvement of the private sector in order to comply with the real needs of the industrial sector in terms of programming, data analysis, cybersecurity, and digital project management. It is necessary to engage rural areas through the implementation of local digital centers, public workshops, and online learning platforms. Activating practical knowledge, private-state partnership with formal education enables rapprochement with the EU.

RQ2: The application of faster Internet encounters barriers in the processes of digital changes. First of all, significant investments in the improvement of networks are necessary, especially in rural and remote areas.

Second, there are technical challenges such as inadequate equipment, lack of standardization, and complex applications of advanced technological solutions.

Third, existing network infrastructures are slower and more unstable, which creates inefficient operations in industrial branches, economic and economic flows.

Fourth, there are barriers related to regulatory and administrative requirements through slow procedures for obtaining permits, ineffective local and national bodies.

Greater synchronization of the state, private sector, and local communities is necessary. Society's needs include uneven access to the Internet, low digital awareness in certain communities, and the need to educate the population to make better use of innovative technologies in everyday life and the business world. An integrated strategy can enable widely available and fast internet connectivity that supports digital transformation and industrial competitiveness.

5. CONCLUSIONS

The implemented analytical framework confirms the necessity of a synchronized digital transformation of the industrial competitiveness of Serbia in a comparative perspective with the countries of the European Union. Regardless of the fact that some progress has been observed in the areas related to the improvement of digital skills, the application of digital infrastructure, and the growth of the ICT sector, there is a noticeable lag behind the EU average values. This is especially related to the degree of digitization of companies, the capacity of innovative resources, and the more efficient application

of innovative technological changes, which limits the full adherence to the standards of the European digital and industrial environment. The indicators show that only through continuous investments in digital infrastructure, stronger support for industrial modernization, and practices of harmonization with European digital policies can we take the next step.

Qualitative analysis identifies room for further advancement of regulatory frameworks, digitization of public administration, and improvement of human potential.

The conducted research shows that digital policy is a key driver of Serbia's industrial competitiveness in relation to the European Union. According to information from the Western Balkans DESI (Digital Economy and Society Index) from 2022, Serbia had a DESI score of 34.9 points on a scale from 0 to 100. The analysis showed that, although Serbia is making progress in the domain of digital infrastructure, skills development, and the growth of the ICT sector, it still lags behind in the digitization of companies and the implementation of the most current technological solutions. Compared to the EU's average DESI score of 52.3 points, digital backwardness can be seen.

The practice of future research should be the basis for influencing national competitiveness through contributions to the creation of policies that are based on greater investments in the application of artificial intelligence, automation of cloud technologies, and Industry 4.0.

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INTEGRATING CUSTOMER RELATIONSHIP MANAGEMENT STRATEGY WITH LOGISTICS IN LONG-TERM CONSUMER RELATIONSHIPS

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Abstract: Research dealing with consumer-related processes often highlights the need to understand how information is collected, interpreted and applied across several organisational activities that influence long-term relationships. Building on this idea, the paper considers how Customer Relationship Management can serve as a structured way of gathering and interpreting information about consumers, enabling different parts of a company to act on more reliable and coordinated insights. Over time, this approach has developed into a method that helps organisations understand consumer expectations more clearly and connect this knowledge with practical decisions in several business areas. The analysis includes an examination of the ways in which information from Customer Relationship Management is combined with logistical operations that affect the dependability and timing of service outcomes. The paper relies on earlier research and practical examples that describe how various parts of the Customer Relationship Management value chain function and how logistical tasks affect the way consumers judge the reliability and timing of a company's service. Elements such as the availability of products, the accuracy of deliveries, the stability of transport services and the handling of returns are considered because they influence the consumer's general impression of the relationship. The analysis indicates that logistical operations tend to be more predictable when planning incorporates insights derived from consumer-oriented marketing activities. Conclusions point to the necessity of coordinated information flows, integrated technological systems and cross-functional collaboration as prerequisites for realising the full strategic potential of Customer Relationship Management. Based on these insights, the paper recommends strengthening connections between marketing, sales, logistics and customer service in order to improve demand forecasting, streamline internal processes and reinforce competitive positioning. Empirical work published in recent years notes that organisations integrating Customer Relationship Management with logistics tend to have longer consumer engagement and more reliable value retention throughout the relationship cycle.

Keywords: *relationship marketing, Customer Relationship Management value chain, consumer loyalty, Customer Relationship Management software, logistics processes, supply chain.*

Field: Social sciences.

1. INTRODUCTION

The contemporary business environment is characterised by rapid shifts in consumer behaviour and increasing competitive pressure, prompting companies to develop long-term relationships with customers rather than rely on isolated transactions. Relationship marketing therefore becomes a key approach, as it influences customer satisfaction, trust and loyalty, which in turn shape purchasing decisions (Al-Shukry, 2025). Within this context, Customer Relationship Management (CRM) gains strategic importance because it enables the collection and integration of customer data to support coordinated decision-making and the creation of value for multiple stakeholders (Pfajfar et al., 2022). By connecting information from various sources, CRM helps firms more accurately identify customer needs and develop customised offerings, thereby strengthening the role of relationship marketing within the overall business strategy.

Although it is well established that relationship marketing enhances satisfaction and loyalty, less attention has been given to how these effects materialise within the operational aspects of business, particularly in logistics. Delivery accuracy, product availability, response time and complaint handling directly shape the customer experience, making the integration of CRM principles with logistical processes essential for service improvement and relationship stability. Recent studies indicate that aligning these functions supports more accurate demand forecasting, more efficient internal processes and higher long-term customer value (Amin et al., 2023). The aim of this paper is therefore to explore how the integration of CRM strategy and logistical activities influences the formation, maintenance and enhancement of long-term customer relationships, and to identify the key elements of this integration that contribute to greater service reliability, improved coordination of business functions and more consistent value creation for customers.

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2. ESTABLISHING LONG-TERM RELATIONSHIPS WITH CONSUMERS

Long-term relationships with consumers represent one of the main sources of competitive advantage, especially in markets characterised by strong competition and rapid changes in demand. Relationship marketing emphasises the integration of internal processes and external networks to create and deliver superior value to target consumers (Milisavljević et al., 2012), highlighting that the value of a relationship is shaped not only by product quality but also by continuity of experience, trust and cooperation between consumers and companies. These elements help organisations secure more stable revenue streams while reducing dependence on constant customer acquisition (Gummesson, 2008; Hollensen, 2020). Re-engaging former customers with strong profit potential is also considered an important strategic activity in maintaining long-term value (Kačar, 2024). By maintaining such relationships, companies strengthen their long-term market position and improve their resilience to fluctuations in demand.

The development of strong consumer relationships depends on how well an organisation understands customer needs and manages the information available to it. Customer Relationship Management systems support this process by integrating data from sales, marketing, customer service and logistics, which allows companies to make more accurate decisions and apply a personalised approach to each consumer (Buttle, 2004; Lovreta et al., 2010). When information is shared consistently across business functions, companies can identify behavioural patterns, respond more effectively and deliver experiences that match customer expectations. These outcomes contribute to higher satisfaction, more frequent interactions and stronger loyalty, as described in models that emphasise the connection between value, trust and repeated purchasing behaviour (Johnson & Selnes, 2004). Digital transformation further strengthens these processes through advanced analytics, automation and rapid adjustments to changes in consumer behaviour, helping organisations to manage relationships more strategically and efficiently.

Logistics is another essential component of long-term customer relationships because it represents the practical fulfilment of what companies promise. Delivery accuracy, response speed, reliability of information and consistency within the entire service process strongly influence how consumers evaluate their relationship with a brand, particularly in digital and cross-border environments (Guan et al., 2025). Evidence from logistics intensive sectors shows that digital tools such as real-time tracking, automated notifications and multichannel communication increase trust and encourage long-term loyalty (Wu & Rojnruttikul, 2024). When CRM data is connected with logistical processes, companies can establish more coordinated and responsive supply chains. When applied effectively, eCRM solutions improve demand forecasting, reduce inventory costs and accelerate order processing, which strengthens delivery performance and increases customer satisfaction (El Hail & El Koraichi, 2024). Research on supply chain relationships highlights the importance of transparency and information sharing, especially when partners have the digital and organisational capabilities needed to convert shared information into practical improvements (Li et al., 2025). When relationship marketing, CRM, digital technologies and logistics work as one system, companies can provide consistent and reliable value across all customer contact points. This creates a strong foundation for lasting loyalty and supports sustainable competitive performance.

3. CRM VALUE CHAIN

The CRM value chain provides a strategic foundation for attracting, retaining and developing customers through coordinated marketing, sales, logistics and IT activities. Its core role is to determine which customers to serve and how to deliver value, following the logic of customer orientation and relationship marketing (Buttle, 2004). By shifting attention from isolated transactions to value creation across the supply chain, organisations strengthen stability, reduce short-term volatility and align internal functions around customer satisfaction and loyalty.

Customer portfolio analysis is the starting point, helping firms identify segments with the highest profit potential and lifetime value (Kačar & Čavić, 2025). Effective database management and a thorough understanding of customer behaviour enable timely and relevant responses, as information quality directly shapes the firm's ability to meet expectations. Companies that organise and apply customer insights more effectively than competitors achieve higher satisfaction and sustained loyalty (Johnson & Selnes, 2004). Long-term customer relationships provide higher efficiency, lower behavioural uncertainty and more predictable revenue streams, as loyal customers show more stable purchasing patterns and greater continuity in engagement (East et al., 2021). Thus, CRM becomes not only a data system but a mechanism for designing value propositions that reinforce long-term relationships.

Digital technologies have strengthened all stages of the CRM value chain. Modern systems

combine omnichannel communication, advanced analytics and artificial intelligence to support predictive assessments, automated personalisation and real-time interaction (Roy et al., 2025). Their effectiveness requires clear implementation procedures, ethical data management and continual refinement, enabling AI to function as an extension of strategic CRM rather than an isolated tool (Ledro et al., 2025). Building a network of relationships involves collaboration within the organisation as well as with suppliers, distributors and logistics partners. Information exchange becomes the basis of value delivery, as transparency, digital trust and partner capabilities shape service performance (Li et al., 2025). When marketing, logistics and IT operate in a coordinated way, companies reduce errors, accelerate processes and enhance delivery accuracy, providing a stable foundation for long-term relationships (Chowdhury et al., 2025). Customer value is therefore co-created across the broader collaborative network, not by the company alone.

Creating value within the offering requires an integrated view of product quality, customer support and logistical performance. Logistics represents a decisive element of this experience: timely and accurate delivery, transparent tracking and simple return procedures strongly shape customer evaluations. Evidence from online and cross-border commerce shows that logistics quality significantly influences satisfaction and repurchase intentions (Guan et al., 2025). Logistics has therefore evolved into a strategic component of CRM, shaping perceptions of brand reliability and overall value.

Effective relationship management depends on coordinated efforts across all functions involved in customer acquisition, retention and development. Digital tools such as real-time tracking, automated updates and multichannel support enhance transparency and responsiveness, strengthening trust and loyalty, particularly in e-commerce and parcel delivery, where logistics intensity is high (Wu & Rojniruttikul, 2024). The enabling conditions of the CRM value chain include leadership commitment, strong information systems, skilled employees and appropriate logistical infrastructure. When electronic CRM is embedded into inventory management, demand planning and goods-flow optimisation, organisations benefit from more accurate forecasting, lower operating costs and faster order processing, resulting in a more reliable customer experience (El Hail & El Koraichi, 2024), which in turn contributes to a smoother and more dependable customer experience.

Through this integration, the CRM value chain shifts from a traditional marketing framework to a strategic platform that unifies value creation, logistical performance, digital capabilities and supply-chain collaboration. Firms that align these elements achieve consistent service delivery and reinforce long-term customer loyalty, forming a strong basis for sustainable competitive advantage.

4. CRM SOFTWARE

Effective customer relationship management today relies on advanced CRM software that supports real-time data collection, integration and analysis. Although earlier classifications identified five basic CRM groups (Lovreta et al., 2010), the rapid development of cloud services, mobile applications, social media and artificial intelligence has greatly expanded their scope. Modern CRM platforms now integrate marketing, sales, logistics and customer support into a unified system, with the main contemporary categories summarised in Table 1.

Table 1. Summary Overview of the Main Types of CRM Software

Type of CRM Software	Brief Description	Advantages	Sources
SaaS / Cloud CRM	CRM operates via the internet; hosted in a cloud environment	Fast implementation, low initial investment, high scalability	Rossignoli et al. (2017); Lovreta et al. (2010)
On-premise CRM	Installed within the company's internal IT infrastructure; data stored locally	High security control, extensive customisation options	Chiranjeevi et al. (2018)
CRM for SMEs	"Lite" versions of CRM systems with essential functions	Easy to use, lower costs, suitable for business growth	Lovreta et al. (2010)
CRM for Large Enterprises	Deep integration with ERP, logistics, production and BI systems	Process centralisation, advanced analytics, support for complex operations	Stefanov et al. (2023)
Mobile CRM (m-CRM)	Use of CRM through mobile phones and applications	Higher field-sales efficiency, faster communication, access to data on the move	Perez-Vega et al. (2022)
Social CRM (S-CRM)	Linking CRM processes with social media platforms	Greater customer engagement, reputation management, real-time feedback	Song (2023)
Analytical CRM	Focus on data quality and analytical, systemic and service components	Better decision-making, higher customer satisfaction, more precise insight into customer needs	Nilashi et al. (2023)
Green CRM"	CRM supporting sustainable and innovation-driven business models	Supports innovation, better data utilisation, sustainable growth	Gil-Gomez et al. (2020)

Source: Authors' compilation based on relevant literature.

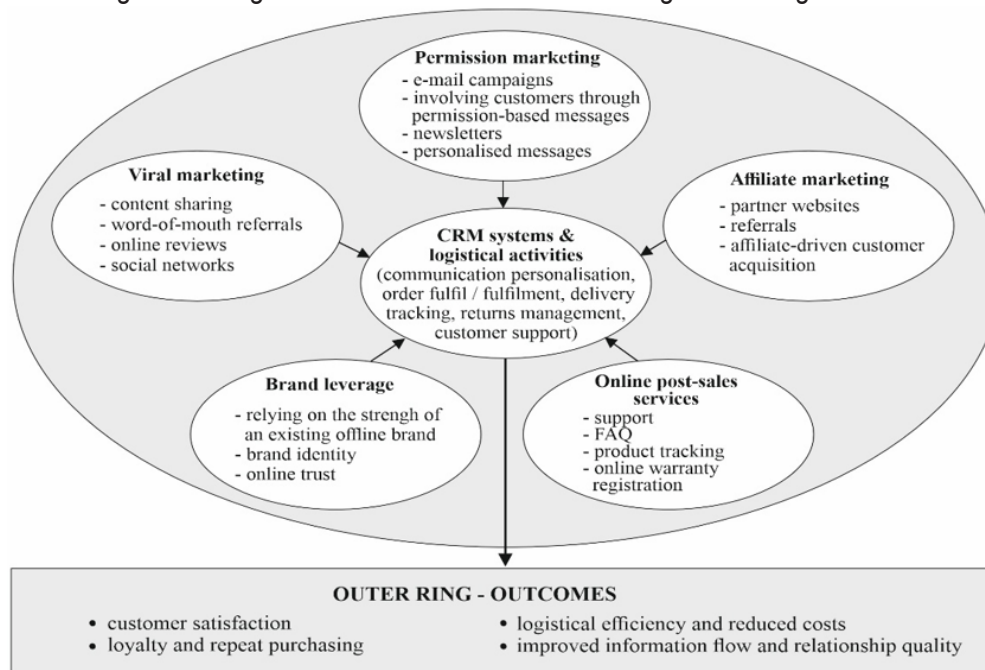
CRM today enhances both customer communication and logistical performance, with research showing that its integration with information systems and lean practices improves coordination, accelerates information flows and increases supply-chain agility (Chowdhury et al., 2025). High-quality data supports more accurate decisions and more reliable management of customer and supplier relationships, while recent studies highlight that the use of artificial intelligence strengthens CRM through predictive analytics, automation and centralised data management (Ledro et al., 2025), enabling organisations to respond more quickly to demand fluctuations, optimise inventory levels and reduce operational uncertainty across the supply chain.

Modern CRM has become a core component of customer-oriented business strategy by linking marketing, sales and logistics into a unified, data-driven system. Contemporary research further confirms that digital innovation embedded in integrated management platforms reinforces the effectiveness of CRM solutions and improves logistical visibility and operational efficiency (Vapa Tankosić et al., 2025), enabling organisations to deliver value more consistently, build stronger long-term loyalty and improve overall supply-chain performance.

5. STRATEGIES FOR ESTABLISHING ONLINE CUSTOMER RELATIONSHIPS

In the digital environment, companies develop online customer relationships through strategies such as permission marketing, affiliate marketing, viral marketing and brand leverage (Turban et al., 2015). Combined with digital after-sales services and CRM systems, these strategies support more personalised communication and improve logistical processes by ensuring smoother and more accurate information flows. Their collective impact on CRM and logistics performance is summarised in Figure 1, which presents an integrated model of digital CRM tactics and supporting logistical activities.

Figure 1. Integrated Model of Online CRM Strategies and Logistical Activities.



Source: Authors

Permission marketing is based on obtaining customers' consent to receive messages, enabling more relevant and less intrusive communication (Turban et al., 2015). E-mail marketing, its most widely used form, delivers higher ROI than most digital channels (Chaffey et al., 2022) and remains central in firms with developed online sales (Clow & Baack, 2022). AI further improves performance through advanced personalisation (Ledro et al., 2025), while well-designed messages strengthen engagement and brand communication (Keller & Swaminathan, 2020), reinforcing its role within digital relationship-building.

Affiliate marketing relies on partner websites that promote products in return for commissions per sale, action or click (Turban et al., 2015). CPS, CPA and CPC models expand brand visibility and open access to new markets, while the credibility of partner platforms increases customer trust. Amazon Associates remains a key example, demonstrating the efficiency of this approach for cost-effective online expansion.

Viral marketing depends on voluntary message sharing, with campaign success shaped by creative content and the selection of appropriate influencers (Chaffey & Ellis-Chadwick, 2022). As consumers trust peer recommendations more than traditional advertising (Lamb et al., 2024), viral campaigns can significantly amplify reach and sales. Research emphasises the reinforcing effect of digital networks (Kotler & Keller, 2017) and the authenticity of online word-of-mouth (Stanković & Đukić, 2025), making these campaigns highly effective in the digital environment.

Brand leverage refers to transferring the strength and recognisability of an established offline brand into the online environment to attract new customers and reinforce existing loyalty (Frost et al., 2023). Consistent identity and communication across channels reduce perceived risk and increase trust, as illustrated by companies such as Wal-Mart and JCPenney, upporting stronger brand presence online.

Digital post-purchase services further support online relationships through transparency and effective assistance after the transaction. Order-tracking systems, online help and automated notifications ensure timely information and faster problem resolution (Turban et al., 2015). Digitalised service systems, such as those implemented by Cisco, reduce operational costs while improving customer satisfaction.

All of these strategies influence logistics by improving information flows, enabling more accurate delivery planning, accelerating returns processing and strengthening the reliability of fulfilment. Integrating CRM systems with digital communication tools and information technologies enhances logistical performance and operational efficiency (Chowdhury et al., 2025), while artificial intelligence increases data-processing accuracy (Ledro et al., 2025). Together, these digital approaches form an essential part of CRM support and contribute to stronger supply-chain performance and long-term customer loyalty.

The integrated model illustrates how permission marketing, affiliate marketing, viral approaches and brand-leverage strategies, combined with CRM systems and digitalised logistics processes, jointly

contribute to stable online customer relationships. Their alignment ensures consistent value delivery, stronger logistical reliability and long-term customer loyalty, forming a foundation for competitive advantage in the digital economy.

6. CONCLUSIONS

Building and sustaining long-term customer relationships requires a continuous understanding of customer needs, consistent delivery of promised value and ongoing, meaningful communication. CRM systems enable firms to organise and apply customer information more effectively, enhancing marketing, sales, procurement, service and logistics. As a result, companies achieve higher loyalty, greater profitability from existing customers and a stronger competitive position, particularly given that retaining customers is far less costly than acquiring new ones. When CRM is integrated with logistical processes, delivery accuracy, process visibility and the overall customer experience improve, while social CRM further deepens customer participation across the value chain.

Digital strategies such as permission marketing, affiliate marketing, viral marketing and brand leverage strengthen online relationships by supporting relevant communication, increasing brand visibility and improving post-purchase processes. When aligned with CRM systems and logistics, these approaches ensure more stable relationships, faster responses to customer needs and greater long-term customer value. The combined effect of CRM, digital marketing and logistics therefore represents a core requirement of modern business practice and a foundation for sustainable competitive advantage.

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